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A RADIATION MODEL FOR CALCULATING ATMOSPHERIC CORRECTIONS TO REMOTELY SENSED INFRARED MEASUREMENTS **VERSION II**

by

Robert D. Boudreau

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A RADIATION MODEL FOR CALCULATING ATMOSPHERIC CORRECTIONS TO REMOTELY SENSED INFRARED MEASUREMENTS VERSION II

Robert D. Boudreau Principal Investigator

September 1973

Report 053

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ABSTRACT

A numerical model is developed which calculates the atmospheric corrections to infrared radiometric measurements due to absorption and emission by water vapor, carbon dioxide, and ozone. The corrections due to aerosols are not accounted for. The transmissions functions for water vapor and carbon dioxide are those given by Davis and Viezee (1964). The transmission function for ozone is that given by Moskalenko (1969). The model requires as input the vertical distribution of temperature and water vapor as determined by a standard radiosonde. The vertical distribution of carbon dioxide is assumed to be constant. The vertical distribution of ozone is an average of observed values. The model also requires as input the spectral response function of the radiometer and the nadir angle at which the measurements were made. A listing of the FORTRAN program is given with details for its use and examples of input and output litsings. Calculations for four model atmospheres are presented to illustrate the nature of the atmospheric correction for a variety of atmospheric conditions and for two different radiometers.

INTRODUCTION

The infrared radiometers used on aircraft and satellites to determine the surface temperature of the earth sense radiation in the most transparent parts of the absorption spectrum of a cloudless, dustless atmosphere. Presently, the most used part of the spectrum is the 800 - 1200 cm⁻¹ wavenumber (8-14µm) atmospheric "window". This window is somewhat dirty due mainly to absorption by water vapor, carbon dioxide, ozone and aerosols (haze, smog, pollution, etc.). Most clouds are so highly absorbing (McDonald, 1960) as to make infeasible the detection of radiation from the earth's surface through the clouds. When viewing clouds the radiometer essentially measures cloud top temperatures. For a comprehensive treatment of the absorption characteristics of the atmosphere, the reader is referred to Goody (1964).

In order to ascertain surface temperature from the radiance measured by the radiometer, the absorption and emission by water vapor, carbon dioxide, ozone and aerosols must be accounted for. This report describes the second version (Boudreau, 1972) of a computerized model which is being developed for calculating the atmospheric corrections to radiometric measurements made in the 800 - 1200 cm⁻¹ window. The atmospheric correction is defined as the difference between the actual temperature and the temperature as determined remotely by radiometer. This model is written in FORTRAN IV and calculates the atmospheric correction due to water vapor, carbon dioxide, and ozone only. The transmission functions for water vapor and carbon dioxide are taken to be those given by Davis and Viezee (1964). The transmission function for ozone is that given by Moskalenko (1968, 1971).

The vertical distribution of temperature, water vapor, carbon dioxide and ozone must be specified for the model from the surface to the altitude for which the correction is to be calculated. The variation in the vertical distribution of carbon dioxide is small and assumed to be constant at 330 ppm. An average vertical distribution of ozone for 20°N given by Hering and Borden (1964) and shown in Fig. 1 is used since ozonesonde observations are not readily available. The model accepts as input the vertical distribution of temperature and water vapor as determined by a standard radiosonde. The model assumes that relative humidity is 10% when the humidity is low enough to cause "motorboating" to be reported in the radiosonde. Above the highest altitude for which measurements have been made by radiosonde and to a pressure altitude of 1 mb, the model uses the temperature structure from average soundings for 30°N which are given by Valley (1965). For the months of May through October and November through April, the 30°N soundings for the months of July and January, respectively, are used. The distributions for 30°N are used in the model since the model will be applied to remotely sensed data taken around that latitude, but it may be modified easily to incorporate other distributions.

The water vapor profiles used for the upper atmosphere are those proposed by Clark (1973) based on the work of Goldman, et al., (1973), Mastenbrook (1971), McKinnon and Morewood (1970), Murcray et al., (1969), and Scholtz et al., (1970). Two water vapor profiles are used: a summer profile for the months of May through October and a winter profile for the months of November through April. These profiles are shown in Fig. 2.

Since measurements of the vertical distribution of aerosol concentration and composition are not usually available and since the transmission

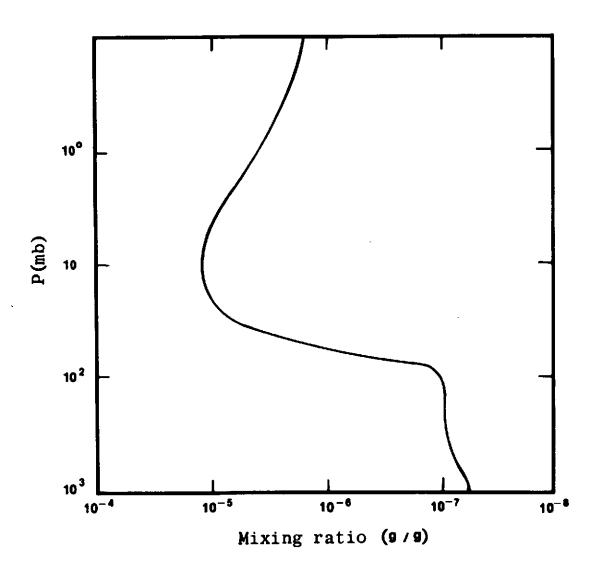


FIG. 1. Vertical distribution of ozone mixing ratio for 30°N (after Hering and Borden, 1964).

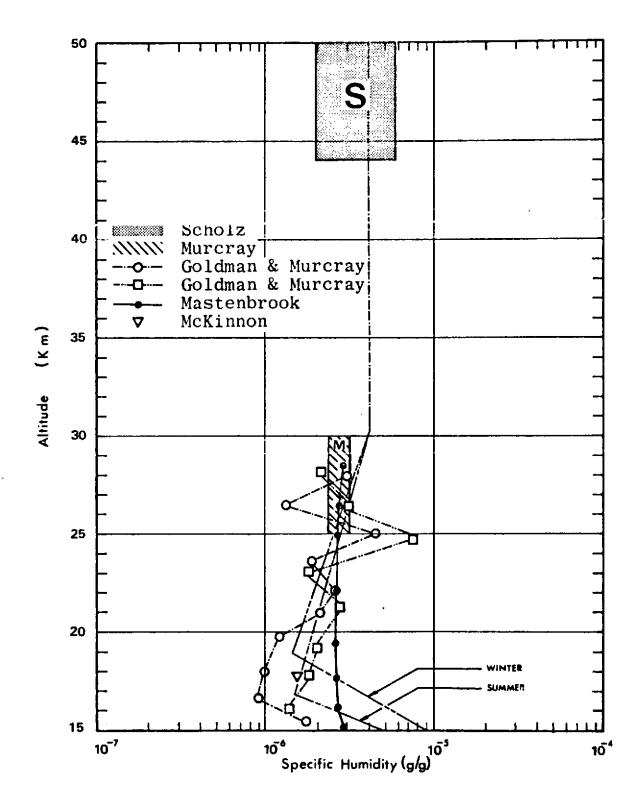


Fig. 2. Proposed average water vapor profiles for the upper atmosphere for summer and winter (from Clark, 1973).

functions for aerosols are not well known, the model at this stage of development does not include the atmospheric correction due to aerosols. The present model was developed in part to study the effects of aerosols on remotely sensed infrared data. The difference between the actual atmospheric correction determined from a remote sensing experiment and the calculated atmospheric correction given by the model described here for the same experimental condition would be due mainly to aerosols. Hence, the gross aerosol correction can be studied empirically using this model.

The atmospheric correction is specific to each radiometer, being a function of the radiometer's spectral response function, which describes the variation in the radiometer's response across the spectral band of 800 - 1200 cm⁻¹. Therefore, the model also requires as input the spectral response function of the radiometer for which the atmospheric correction is being calculated.

DEVELOPMENT

Radiometrically determined temperature. If no atmosphere were present, an infrared radiometer at altitude z would detect a radiance, Do, expressed by

$$D_{0} = \int_{v_{1}}^{v_{2}} \gamma(v)S(v,\theta,T_{S})dv, \qquad (1)$$

where ν is wavenumber, $\gamma(\nu)$ is the radiometer's response function, ν_1 and ν_2 are the limits within which $\gamma(\nu)\!>\!o,\;S(\nu,T_S)$ is the radiant intensity leaving the earth's surface, T_S is the surface temperature of the earth, and θ is the madir angle at which the radiometer is veiwing the earth's surface. Eq. (1) and the equations for radiance which follow implicity express the radiance integrated over the solid angle viewed by the radiometer.

Surface temperature may be obtained from measurements of $\mathbf{D}_{\mathbf{O}}$ as follows. Eq. (1) may be written as

$$D_{0} = \gamma S(v_{0}, \theta, T_{S}) \Delta v, \qquad (2)$$

where v_0 is defined such that

$$S(v_0, \theta, T_S) = \int_{v_1}^{v_2} S(v, \theta, T_S) dv / (v_2 - v_1), \qquad (3)$$

$$v_1 = \int_{v_2}^{v_2} \gamma(v) S(v, \theta, T_S) dv / \int_{v_3}^{v_2} S(v, \theta, T_S) dv, \qquad (4)$$

$$\gamma = \int_{v_1}^{v_2} \gamma(v) S(v, \theta, T_S) dv / \int_{v_1}^{v_2} S(v, \theta, T_S) dv, \qquad (4)$$

and

$$\Delta v = v_2 v_1. \tag{5}$$

Assuming that the earth is a black-body radiator, we take

$$S(v, \theta, T_S) = B(v, T_S) = av_0^3/[exp(bv_0/T_S)-1],$$
 (6)

where a = 8.9349×10^{-13} cal cm²sec⁻¹ster⁻¹ and b = 1.4385 cm deg. The use of (6) in (2) allows us to solve for T_s,

$$T_{S} = bv_{O}/\ln((\gamma \Delta va^{3}_{O}/D_{O})+1). \tag{7}$$

The surface temperature determined by this method is referred to as an equivalent blackbody temperature or a brightness temperature since it is not the actual surface temperature unless the surface radiates as a blackbody.

Sensing through a horizontally homogeneous atmosphere at a nadir angle θ , a radiometer at height, w_r , detects a radiance, $D(w_r)$, given by

$$D(w_r) = \int_{v_1}^{v_2} \gamma(v) \left[\int_{0}^{w_r} B(v, w) \frac{\partial \tau}{\partial w}(v, (w_r - w) f(\theta)) dw + B(v, T_s) \tau(v, w_r f(\theta)) \right] dv,$$
(8)

where τ is the transmissivity of the atmosphere, B(v,w) is the Planckian function given by (6), $f(\theta)$ a function which accounts for the increased atmospheric path length when viewing at nadir angle θ (if a flat earth is assumed, $f(\theta) = \sec \theta$), and height, z, is expressed in terms of precipitable water, w. The relation between height and precipitable water is given by z

$$W = \int_{0}^{z} \rho dz/\rho^{2}, \qquad (9)$$

where ρ and ρ' are the density of water vapor and liquid water, respectively. The Planckian function, B(ν ,w), can be expressed as a function of w because atmospheric temperature, T=T(w). A derivation of (8) is given by Boudreau (1968).

Spherical earth geometry. Due to its spherical shape, the earth appears as a disk below the aircraft or satellite. The edge of the disk is located at a nadir angle, θ' , which with the help of Fig. 3 is seen to be given by

$$\theta' = \arcsin (R/R+H) \tag{10}$$

where R = 6370 km, the radius of the earth, and H is the altitude of the sensor. Hence, we only need concern ourselves with data taken at $\theta < \theta'$. For $\theta < \theta'$, the path length, ds, at z is given by Wark, et al., (1963) as

$$ds = [(R+z)m_zdz]/[(R+z)^2m_z^2-m_0^2(R+z_0)^2]^{1/2}, \qquad (11)$$

where n_Z and n_Q are the indices of refraction of air at z and the surface, respectively, and z_Q is the minimum height of the refracted ray. Now, n_Z and n_Q are obtained from the formula

$$n = T + CP/T \tag{12}$$

where P and T are air pressure (mb) and temperature (K) and

$$C = 77.526 \times 10^{-6} \text{ K/mb}.$$
 (13)

 z_0 is obtained from Eqs. (2) and (4) of Wark et al., (1963), i.e.,

$$z_0 = ((R+z)\sin\theta)/n_0 - R. \tag{14}$$

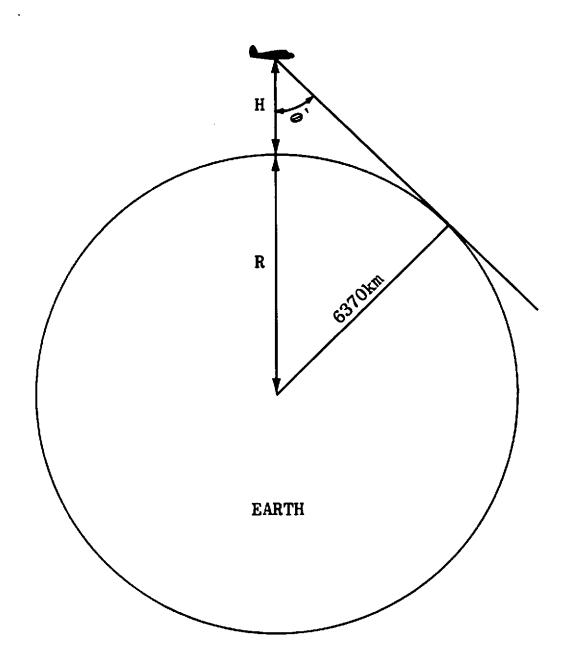


FIG.3. The earth as seen from an altitude, H.

<u>Transmissivity functions</u>. The transmissivity, τ_W , of water vapor for wave number intervals of 25 cm⁻¹ in the 800 to 1200 cm⁻¹ window is given by Davis and Viezee (1964) as

$$\tau_{W}(\Delta v, w) = \exp \left\{-\left[L(v)wP\right]\right\}. \tag{15}$$

Occasionally it is required to calculate atmospheric corrections for an instrument that has a response that extends slightly beyond the 800 to 1200 cm⁻¹ window. Outside the 800 - 1200 cm⁻¹ window, Davis and Viezee (1964) give the following transmissivity functions. For water vapor transmissivity at ν < 800 cm⁻¹,

$$\tau_{W}(\Delta v, w) = \exp\{-AL(v)w(1+3.17AL(v)w/P)^{-0.5}\},$$
 (16)

in which

$$A = [0.76 + (0.58 + 0.48P^{2})^{0.5}] p^{-0.1} (T/T_{0})^{b(v)}.$$
 (17)

For water vapor transmissivity at v > 1200 cm⁻¹,

$$\tau_{w}(\Delta v, w) = \exp\{-BL(v)w(1+4.9BL(v)w/P)^{-0.5}\},$$
 (18)

in which

$$B = [1.18+(1.38+0.48P^2)^{0.5}]P^{-0.15}.$$
 (19)

For carbon dioxide transmissivity at 550 $\leq v \leq$ 800 cm⁻¹,

$$\tau_c(\Delta v, \mathbf{w}_c) = \exp[-0.4P^{0.8} \{ [ck(v)\mathbf{w}_c + 1]^{0.5} - 1 \}],$$
 (20)

where

$$c = (0.87 + P^{0.8})P^{a}(T/T_{0})^{c(v)}$$
 (21)

and

$$a = 1.2 - 0.15 \log P.$$
 (22)

In (15) through (22), P = p/1013.2, where p is pressure in millibars, T_0 = 273.16K, w_C is the optical path in atmos-cm of carbon dioxide, and values of L(v), k(v), b(v), and c(v) for increments of Δv =25 cm⁻¹ are listed in DECK 3, BLOCK DATA PROGRAM of the FORTRAN program given in the Appendix.

The transmissivity, $\tau_0(\delta v, w_0)$ of ozone for irregular wave number intervals of ≤ 10 cm⁻¹ in the 602-847, 965-1175, 2000-2180 cm⁻¹ bands is given by Moskalenko (1969, 1971)

$$\tau_{O}(\delta v, w_{O}) = \exp[-\beta(v)w_{O}^{m(v)}P^{n(v)}], \qquad (23)$$

where w_0 is the optical depth of ozone and values of $\beta(\nu)$, $m(\nu)$ and $n(\nu)$ for $\delta\nu \leq 10 cm^{-1}$ are listed in DECK 3, BLOCK DATA PROGRAM of the program given in the Appendix.

The ozone transmissivity is specified for $\delta\nu \leq 10 \text{cm}^{-1}$ and is matched to the 25cm^{-1} intervals of the water vapor transmission as follows. The ozone transmissivity, $\tau_0(\Delta\nu, w_0)$, for the 25^{-1}cm intervals is taken to be Planckian - weighted transmissivity of the $\delta\nu$ intervals,

$$\tau_{0}(\Delta v, \mathbf{w}_{0}) = \int_{v}^{v''} B(v, T) \tau_{0}(\delta v, \mathbf{w}_{0}) dv / \int_{v'}^{v''} B(v, T) dv, \qquad (24)$$

where $\Delta v = v'' - v'$, the 25cm^{-1} interval of water vapor. The relationship between Δv and $\delta v_k = v_{k+1} - v_k$ is shown in Fig. 4. Eq. (24) is calculated as (ommitting the w_0 symbolism for symplicity)

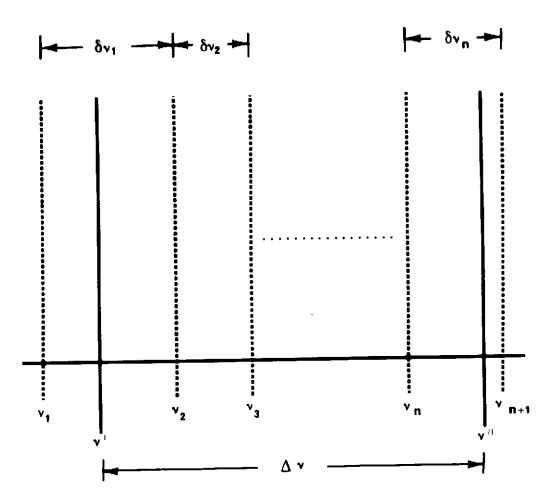


FIG.4. The relationship between the irregularly-spaced ozone intervals, δv_{k} , and the larger (25cm⁻¹) water vapor intervals, Δv .

$$\tau_{0}(\Delta v) = \frac{1}{M} [B_{1}(T)\tau(\delta v_{1})(v_{2}-v') + B_{2}(T)\tau(\delta v_{2})(v_{3}-v_{2}) + \cdots + B_{m}(T)\tau(\delta v_{m})(v''-v_{m})], \qquad (25)$$

in which

$$M = B_1(T)(v_2-v') + B_2(T)(v_3-v_2) + \cdots + B_n(T)(v''+v_n),$$
 (26)

$$B_1(T) = B((v'+v_2)/2,T),$$
 (27)

$$B_k(T) = B((v_k+v_{k+1})/2,T),$$
 (28)

$$B_n(T) = B((v_n + v'')/2, T).$$
 (29)

Since the highest ozone concentration are found in the stratosphere, an average T = 240°K is used in calculating (25) - (29).

Water vapor, carbon dioxide, and ozone radiate mutually in some bands in the spectrum. For these bands, the transmissivity is taken to be the product of the individual transmissivities, i.e.,

$$\tau = \tau_{W}(\Delta v, W) \tau_{C}(\Delta v, W_{C}) \tau_{O}(\Delta v, W_{O}). \tag{30}$$

outside the mutual bands, $\boldsymbol{\tau}$ is taken to be $\boldsymbol{\tau}_{\boldsymbol{W}}.$

<u>Numerical model</u>. We solve a numerical analog to (8) since is can not in general be solved in closed form. In finite difference notation, (8) may be approximated as

$$D(w_{m}) = \sum_{j=1}^{n} \gamma(v_{j}) \left[\sum_{i=1}^{m-1} B(v_{j}, \overline{T}_{i}) \{ \tau(v_{j}, (w_{m}-w_{i+1})f(\theta)) - \tau(v_{j}, (w_{m}-w_{i})) \} \right]$$

$$sec) \} + B(v_{j}, T_{s}) \tau(v_{j}, w_{m}f(\theta)) \Delta v_{j}, \qquad (31)$$

where the Δv_j are constrained by the transmissivity functions to be $25 cm^{-1}$, v_j is the value of v at the midpoint of the $25 cm^{-1}$ interval, and

$$\overline{T}_{i} = (T_{i+1} + T_{i})/2.$$
 (32)

In the computation of the $\tau(\nu_j, w_k)$ from the Davis and Viezee functions and the Moskalenko function, in place of P and T, we use an effective pressure, P_e , and temperature, T_e , given by

$$X_{e} = \int_{W_{L}}^{W_{m}} X dw / \int_{W_{L}}^{W_{m}} dw = \frac{1}{W_{m} - W_{k}} \sum_{\ell=k}^{m-1} \Delta W_{\ell} (X_{\ell+1} - X_{\ell})/2, \qquad (33)$$

where X can be pressure or temperature, w is the optical depth of the atmospheric constituent for which $\tau(\Delta v, w)$ is being calculated [e.g. w=w_0 for $\tau_0(\Delta v, w_0)$], and

$$\Delta w_{\ell} = w_{\ell+1} - w_{\ell}. \tag{34}$$

The concentration of carbon dioxide is assumed to be constant; therefore, the effective pressure of carbon dioxide can be calculated from (33) as follows:

$$P_{e} = \int_{W_{k}}^{W_{m}} P dw / \int_{W_{k}}^{W_{m}} dw = \int_{z_{k}}^{z_{m}} p_{\rho} dz / \int_{z_{k}}^{z_{m}} \rho dz$$
 (35)

through the use of (9). The use of the ratio, q_c , for carbon dioxide

$$q_c = \rho_c/\rho_a, \tag{36}$$

where ρ_C and ρ_a are the densities of carbon dioxide and air, respectively, and the hydrostatic equation,

$$\frac{\partial p}{\partial z} = -\rho_{a}g, \tag{37}$$

in which g is the acceleration of gravity (98 $\,$ cm sec^{-2}), in (35) obtains

$$p_{e} = \int_{p_{m}}^{p_{k}} p \mathbf{q} dp / \int_{p_{m}}^{p_{k}} q dp.$$
 (38)

Now, q_C = constant, therefore (38) may be integrated to obtain

$$p_e = (p_k + p_m)/2.$$
 (39)

The radiance $D(w_m)$ detected by the radiometer is converted to an equivalent blackbody temperature, T_r , through use of the calibration relation

$$D_{c} = \int_{v_{1}}^{v_{2}} \gamma(v)B(v,T_{r})dv \doteq \sum_{j=1}^{n} \gamma(v_{j})B(v_{j},T_{r})\Delta v_{j}.$$
(40)

Eq. (40) is used to calculate a table of D_c versus T_r over the range of T_r that is expected to be encountered when using the radiometer. Then we interpolate in this table to find T_r that corresponds to the value of $D(w_m)$ obtained from (31). The atmospheric correction, ΔT_s , is given by

$$\Delta T_{S} = T_{S} - T_{r}, \tag{41}$$

where $T_{\rm S}$ is assumed to be the air temperature at the surface as reported by the radiosonde observation.

Optical depths. Precipitable water, w, is computed from temperature, dew point temperature, and pressure as follows. The hydrostatic equation, (37), is used to write (9) as

$$w = \int_{p_0}^{p} q \, dp/\rho \, g = \sum_{\ell=1}^{L} \overline{q} \, \Delta \ell/\rho \, g, \qquad (42)$$

where \overline{q} is the average specific humidity in the layer Δp . In (42), q is obtained from the relation (Haltiner and Martin, 1957)

$$q = 0.622e/(p-0.378e),$$
 (43)

in which vapor pressure, e, is determined from dew point temperature using the Goff-Gratch relation specified in List (1971).

The optical depth of carbon dioxide in atm-cm is computed from

$$w_{C} = \frac{1}{\rho_{C}^{-1}} \int_{0}^{\rho_{C}} dz. \tag{44}$$

where ρ_{C}^{+} is the density of carbon dioxide at STP. The use of (36) and (37) in (44) gives

$$w_{C} = -\frac{1}{\rho \cdot c^{g}} \int_{p_{O}}^{p} q_{C} dp$$
 (45)

which, since $q_C = 0.5x10^{-3}$, may be integrated to obtain

$$w_C = 0.260 (p_O - p)$$
 (46)

where p is in millibars.

The optical depth of ozone in atm-cm is computed from

$$w_{0} = \frac{1}{\rho_{0}^{1}} \int_{0}^{z} \rho_{0} dz = -\frac{1}{\rho \sigma' g} \int_{\rho_{0}}^{\rho} \frac{\rho o}{\rho a} dp, \qquad (47)$$

by (37). In (47), ρ_0 is the density of ozone and ρ^{\prime}_0 is the density of ozone at STP. Letting

$$q_0 = \rho_0 / \rho'_0 \tag{48}$$

(47) is calculated from

$$w_{O} \doteq \frac{1}{\rho^{T}g} \sum_{k=1}^{L} \overline{q}_{O} \Delta p_{k}$$
 (49)

where \overline{q}_0 is the average value for the layer Δp .

SAMPLE CALCULATIONS

For purposes of illustrating the atmospheric correction model and the nature of atmospheric corrections, calculations are presented for four typical distributions of water vapor and temperature given by Valley (1965) and for two radiometers: the NOAA-2 SR and the RS-18. The response functions for the NOAA-2 SR and the RS-18 are shown in Fig. 9. The vertical distributions to a pressure altitude of 100 mb of temperature and dew point for the four model atmospheres are shown in Figs. 10 - 13. The atmospheric corrections which correspond to the four model atmosphere are shown for the NOAA-2 SR in Fig. 14 and for the RS-18 in Figure 15.

As can be seen in Fig. 9, the response of the NOAA-2 SR avoids the ozone and carbon dioxide bands and is therefore only sensitive to absorption and emission by water vapor. Fig. 14 shows that for the four model atmospheres the atmospheric correction is positive and increases with height. In the upper levels (> 300 mb) the correction increases more slowly than at lower levels because specific humidity becomes very low. As the amount of water vapor approaches zero with increasing height, the atmospheric correction approaches a constant value with height.

The spectral response of the RS-18 radiometer is much broader (see Fig. 9) than that of the NOAA-2 SR; it's response extends into the carbon dioxide band and contains the ozone band. Fig. 15 shows that the atmospheric correction for the RS-18 does not approach zero with increasing height above 300 mb but due to emission and absorption by carbon dioxide and ozone continues to increase to approximately 10 mb and then decreases with increasing altitude. The decrease in correction above 10 mb is due

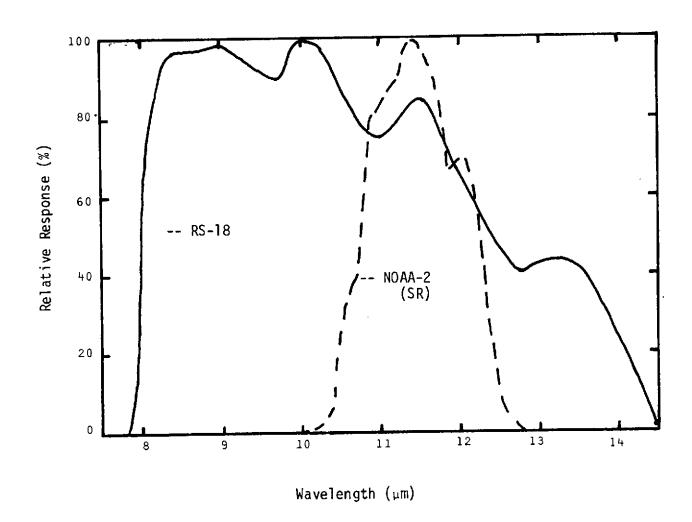


Fig. 9. Response Functions for the RS-18 and NOAA-2 SR.

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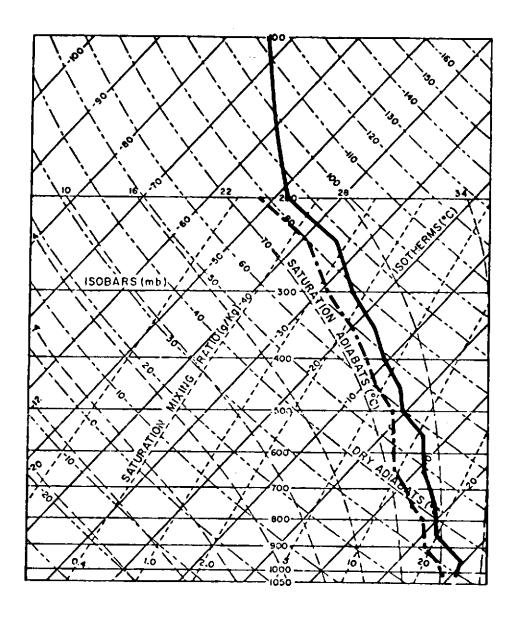


Fig. 10. Vertical Distribution of Temperature (Solid Line) and dew point (dashed line) for Model #1 - Tropical Storm.

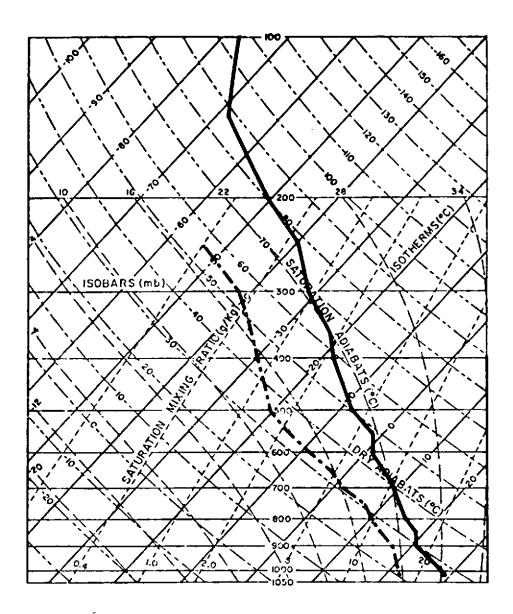


Fig. 11. Vertical Distribution of Temperature (Solid Line) and Dew Point (Dashed Line) for Model #2 - Sub-tropical Summer.

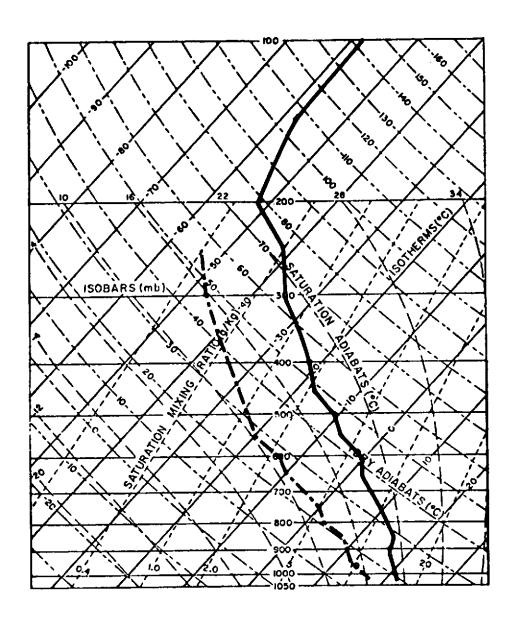


Fig. 12. Vertical Distribution of Temperature (Solid Line) and Dew Point (Dashed Line) for Model #3 - Mid-latitude Summer.

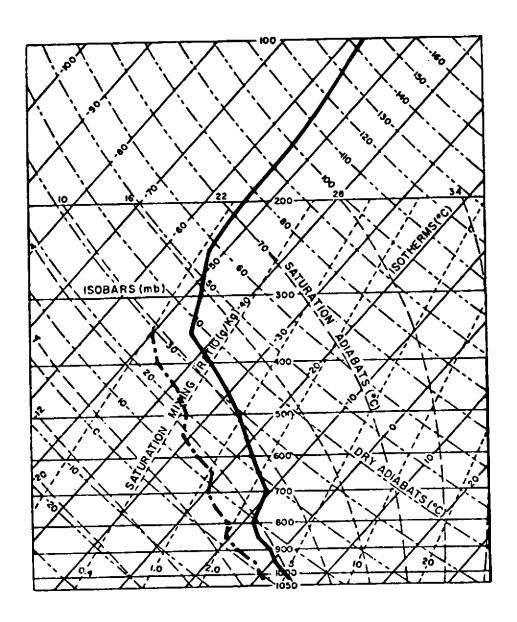


Fig. 13. Vertical Distribution of Temperature (Solid Line) and Dew Point (Dashed Line) for Model #4 - Mid-Latitude Winter.

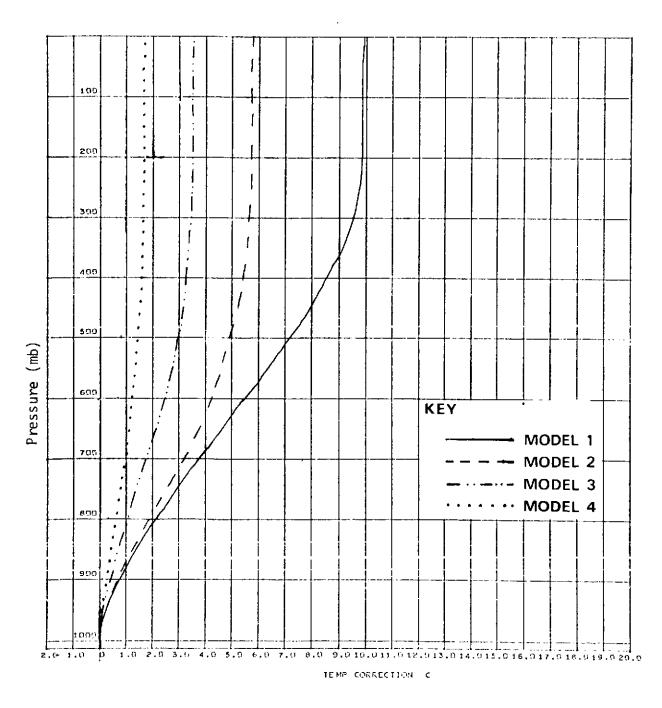


Fig. 14. Atmospheric Correction vs. Pressure Altitude for the NOAA-2 SR at Zero Nadir Angle.

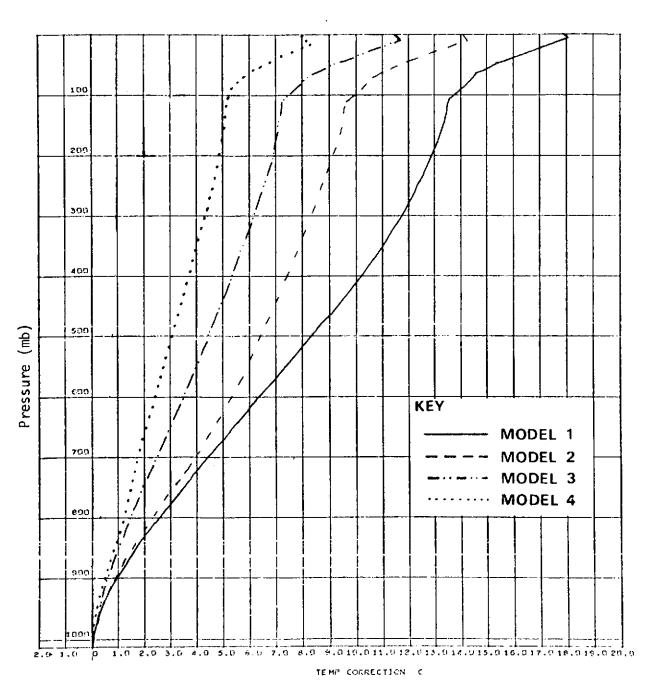


Fig. 15. Atmospheric Correction vs. Pressure Altitude for the RS-18 Radiometer at Zero Nadir Angle.

to the increase of temperature with height in the stratosphere (~ 100 - 1 mb) such that at about 10 mb the temperatures are greater than the effective radiating temperature of the atmosphere below. The maximum concentration of ozone occurs around 10 mb and the increased emission due to ozone at these warmer temperatures causes the radiance to increase with height above 10 mb which results in decreasing the atmospheric correction. The RS-18 is an airborne scanning radiometer designed for obtaining low altitude infrared imagery. It is obviously ill-suited for satellite application due to the effects of ozone and carbon dioxide.

1

The temperature lapse rates do not vary significantly in the model atmospheres. As such, the magnitude of the atmospheric correction is primarily a function of the amount of water vapor. The atmospheric correction for the NOAA-2 SR varies (see Fig. 14) from 9.8C for the very humid atmospheric model 1 (Tropical Storm) to 1.7C for the relatively dry atmospheric model 4 (Mid-latitude Winter). Similarly, the atmospheric correction for the RS-18 being flown at a pressure altitude of 700 mb (\sim 10,000 ft.) varies from 4.4C for the humid Tropical Storm to 1.8C for the drier Mid-latitude Winter model.

The above calculations were made for zero nadir angle. The effect of viewing at a nadir angle greater than zero would be to displace the curves in Figs. 14 and 15 to the right, i.e. toward larger atmospheric correction. This larger correction is due to the longer atmospheric path encountered when the surface is viewed at a nadir angle greater than zero. The longer atmospheric path increases the magnitude of the atmospheric correction.

Atmospheric corrections for the Eglin, AFB, Florida, 1115 GMT, 21 November 1971 radiosonde (shown in Fig. 16) illustrate the effects of a

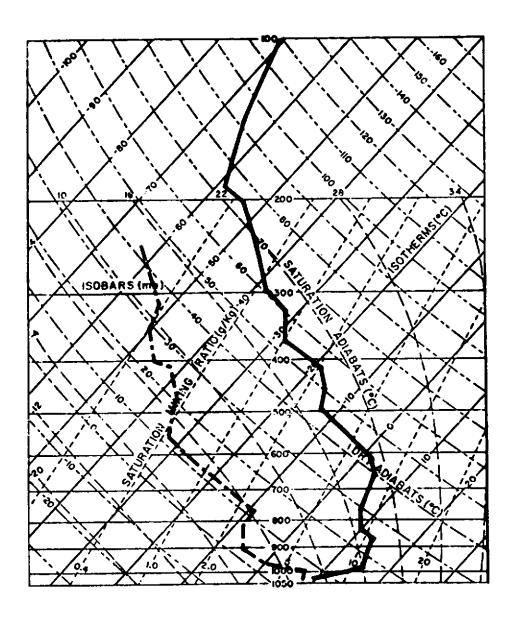


Fig. 16. Eglin AFB, Florida, 1115 GMT 21 November 1971 Radiosonde. Temperature (Solid Line) Dew Point (Dashed Line).

temperature inversion at the surface on atmospheric correction. The temperature increases approximately 5 degrees C from the surface to 1500 feet. The emission from this layer of air which is warmer than the surface causes the atmospheric correction as shown in Fig. 17 to be negative to an altitude of 14,000 ft. Above 14,000 ft. the correction becomes positive.

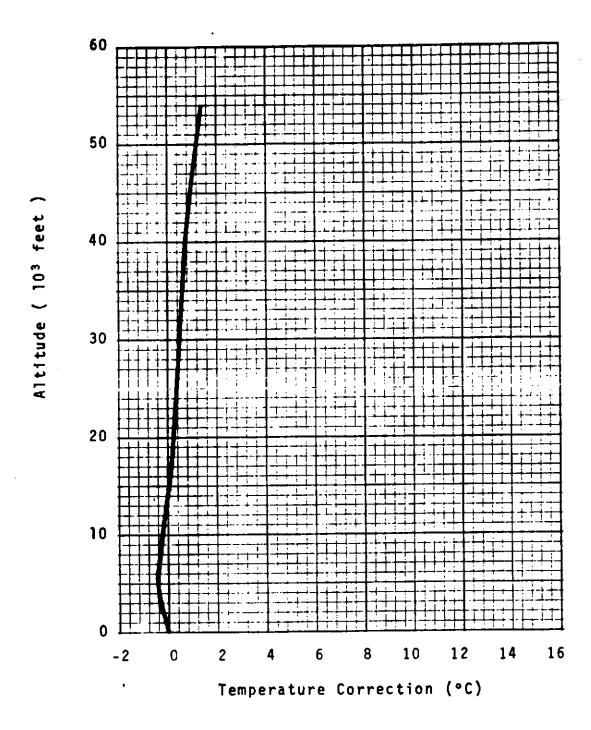


Fig. 17. Atmospheric Correction vs Altitude for Eglin AFB, Florida, 1115 GMT, 21 November 1971, Radiosonde. PRT-5 at Zero Nadir Angle.

SUMMARY AND RECOMMENDATIONS

A numerical model has been developed which calculates the atmospheric corrections due to water vapor, carbon dioxide and ozone. Future versions of this model should include the corrections due to aerosols so that the model will have more general applicability. When more general versions of this model are developed, they should be subjected to the test of comparison with observation. Of course the present model can be used to calculate atmospheric corrections when aerosol concentration is low. Furthermore, the difference between the actual correction determined from a remote sensing experiment and the calculated correction given by the radiation model for the same experimental condition would be due mainly to aerosols. Hence, the gross aerosol correction can be studied empirically using the model.

APPENDIX

General. In order to facilitate the comparison of the model as described by formulae in the text and the FORTRAN program which follows, a listing of FORTRAN symbols and their corresponding text symbols is given in Table 1.

Table 1. FORTRAN symbols and their corresponding text symbols.

FORTRAN	TEXT	DEFINITION
A		A temporary variable used in transmission computations
ABSOR	L _ν	An absorption coefficient for transmission through water vapor in the wave number range 25 to 2150 cm ⁻¹
ABSOR C	k _υ	An absorption coefficient for transmission through carbon dioxide in the wave number range 550 to 800 cm ⁻¹
ABSORO		An absorption coefficient for transmission through ozone in the wave number range 575 - 2150 cm ⁻¹
ANGLE	θ	Observation angle from nadir to target
ATCENT	w _c	A table of optical depths of carbon dioxide in atmosphere centimeters
ATMOS	$B(v_j, \overline{T}_i)$	The blackbody function for wave number \mathbf{v}_{j} and temperature T_{i}
В		A temporary variable used in transmission computations
BBODY	$B(v_j, \overline{T}_i)$	The blackbody function for wave number $\mathbf{v_j}$ and temperature $\overline{\mathbf{T_i}}$
BETA	β	A temporary variable used in transmission computations
С		A temporary variable used in transmission computations

Table 1. continued

FORTRAN	TEXT	DEFINITION
CPRESS		Effective pressure of carbon dioxide
D		A temporary variable used in transmission computations
DEGREE		A table of temperatures whose midpoint is the surface target temperature
DELTRA		The change in transmissivity between laye
DETECT	D(w _m)	The detector intensity, cal cm ⁻² sec
DEWAVG		Average dewpoint of an atmospheric layer
DEWPT		Dew point temperature
DLTEMP	Δ ^T s	Temperature correction from surface to sensor
DRTEMP	T _r	Simulated temperature observed by sensor
EXPRESS	P _e	Effective pressure of water vapor
ETEMPS	T _e	Effective temperature of water vapor
EXPOMO	m(v)	An absorption exponent for transmission through ozone in the wave number range 600 to 2150 cm ⁻¹
EXPON	b _v	An absorption exponent for transmission through water vapor in the wave number range 800 to 1200 cm ⁻¹
EXPONC	c	An absorption exponent for transmission through carbon dioxide in the wave number range 550 to 800 cm ⁻¹
EXPONO	n(v)	An absorption exponent for transmission through ozone in the wave number range 600 to 2150 cm ⁻¹
FUNCTI	Υ	The percent response of a sensor to energy in a given wave number interval
HEADER		A table for instrument names
HEAD1 HEAD2 HEAD3		Temporary variables for these instrument names

Table 1. continued

FORTRAN	TEXT	DEFINITION
HEATER	D _C	A blackbody intensity table simulating instrument response to a blackbody
HEIGHT	z	A table of radiosonde observation altitudes
HIGH		Average height of an atmospheric layer
HUM	q	A table of specific humidities for each atmospheric layer
HUMID		Average water vapor mixing ratio of an atmospheric layer
I	i	Atmospheric layer index
INTEN		Sum used to determine integral detector intensity
INTER	٧j	A table of wave number mid-points
INTERV	^{ک۷} j	A wave number interval
J	j	The wave number interval index
LEVELS		The number of levels at which radiosonde data is given or is interpolated
LIM	m-1	The maximum number of layers to the level of observation
LIMIT	m	The number of levels of data available
ONE		1.0
OTCENT	w _o	Optical depth of ozone in atmosphere centimeters
OZONE	\overline{q}_0	A table of ratios of the density of ozone to its density at STP for each atmospheric layer
PART	q	A specific humidity for determining precip- itable water

Table 1. continued

FORTRAN	TEXT	DEFINITION
PART1 PART2 PART3 PART4 PART5 PART6		Temporary variables used to compute vapor pressure
PRATIO	P	The ratio of the average pressure within an atmospheric layer to a standard of 1013.2 mb
PRESS	р	A table of pressures
RESPON	γ(ν)	A table of response functions defining an instrument
SFCBB		The contribution from a surface target image
SLOPEA SLOPEB		Temporary variables used to perform linear interpolation on blackbody intensity functions
STEPSZ		The desired step size between atmospheric levels
TEMPER	Τ _i	A table of atmospheric temperatures
TEMPOR	T _i	The average temperature of an atmospheric layer
THETA		Angle in radians
TRANGE		The width in degrees of the temperature calibration table
TRANS	τ	The transmissivity of the atmosphere
TRANSC	TC(DV,WC)	The transmissivity at a level due to carbon dioxide absorption
TRANSM	τ (υ, w _k)	The transmissivity of the atmosphere from the surface to level k
TRANSO*	τ ₀ (δυ, w ₀)	The transmissivity at a level due to ozone absorption
TRANSER	τ _W (Δυ,w)	The transmissivity at a level due to water vapor absorption

Table 1. continued

FORTRAN	<u>TEXT</u>	DEFINITION
TRATIO	T/T _o	The ratio of a level's average temperature to a standard temperature of 273.16K
	373.16/T	The ratio of the steam point to a saturation temperature when used to compute vapor pressure
VAPER	е	The vapor pressure used to compute precip- itable water
WATER	W	A table of precipitable centimeters of water vapor
WATERC		The amount of carbon dioxide in atmos-cen- timeters for a given layer at a given angle
WATERO		The amount of ozone in atmosphere centimeter for a given layer at a given angle
WATERS		The amount of water vapor in precipitable centimeters for a given layer at a given angle
WAVENO	ν	The wave number mid-point
WHOLE		A temporary sum used to determine integral precipitable water and upwelling radiation

Program Description. The description of the FORTRAN program which follows is taken from Halbach (1973). The program is written for use on a UNIVAC 1108 EXECUTIVE system and has various types of computation schemes and output displays which are appropriate to the users needs. The program control flow charts (Figs. 7 and 8) and lead card descriptions (Tables 2-7 and Figs. 5 and 6) give a description of these options. The program requires 25,000 locations in core. The user should be familiar with the radiative transfer equation and the logic of the program which is outlined in the program control flow charts (Figs. 7 and 8) in order to execute the options available in the program. The formats for input of data to the program are given in FORMAT statements in the program listing.

Table 2. An Example of Lead Card Arrangement

<u>Field</u>	<u>Columns</u>	<u>Format</u>	<u>Name</u>	<u>I d</u>	<u>entification</u>
Card No.	1, Name	CONTROL			
1	1-10	110	LIMIT	An integer	number telling how many
				non-contro	l cards follow or defining
				a value us	ed for control.
2	11-17	A6	LABEL	Six alphan	umeric characters defining
				the type o	f data or action which
				follows:	
				'TEMPER'	Temperature range
				'ANGLE'	Viewing angle from nadir
				'STEP'	Pressure step size
				'SPHERE'	Apply sphere function
				'FLAT'	Do not apply sphere funct
				'MAXCOR'	S-C4020 minimum temperatu
				'MINCOR'	S-C4020 minimum temperatum
				'MESSAG'	One line message
				'RESPON'	Response function data
				'TRACE'	Transmission function dat
				'WATER'	Radiosonde data
				'EXECUT'	Use previous radiosonde
				'LIMB'	Make limb display
				'DEFAUL'	Load mission radiosonde d
3	23-28	A6	HEAD1*	Six alphan	numeric characters used as
				supplement	tal control data.
				'METERS'	Change meters to feet

^{*}HEAD1, HEAD2, and HEAD3 are sometimes used as display labels.

Table 2. (Continued) 4 29-34 A6 HEAD2	Six alphanumeric characters used as supplemental control data.
	as supplemental control data.
	as suppremental control and
	'KELVIN' Do not change temperatures
5 35-40 A6 HEAD3	Six alphanumeric characters used as
	supplemental control data.
	'OZONE' Load ozone data from cards
ard No. 2, Name WATER	
1 2-8 F7.1 PRESS(I) Atmospheric pressure in millibars
2 11-16 F6.1 DEWPT	Dew point at pressure level
3 21-27 F7.1 TEMPER	Temperature at pressure level
4 31-40 F10.1 HEIGHT	Height at pressure level
5 41-50 E10.5 OZONE(I) Ozone at pressure level
Card No. 3, Name RESPON	•
1 1-7 F7.1 INTERV	Wave-number midpoint interval
2 8-14 F7.4 FUNCT	Percent response of instrument system
	in this interval
Card No. 4, Name TEMPER	
1 1-7 F7.1 TRANG	Temperature range chosen for calibra-
	tion table
Card No. 5, Name MESSAG	
1 2-61 10A6 MESSA(I)	G Lead message line for displays
Card No. 6, Name TRACE	
1 1-10 E10.5 WEIGH	T Index and weighting function for
(1)	trace gas transmission coefficients.
2 11-20 E10.5 ABSOR	O Coefficient for transmission function

Table	(Contin	iued)		
3	21-30	E10.5	EXPOMO (I)	First exponent for transmission function
4	31-40	E10.5	EXPONO	Second exponent for transmission function
Card N	o. 7, Name	DEFAUL		
1	2-8	F7.1	PRESUR	Atmospheric pressure in millibars
2	11-20	E10.5	OZONES	Ozone at pressure level
3	23-28	F6.1	TEMPOR	Temperature at pressure level
4	31-40	E10.5	HUMID	Specific humidity at pressure level

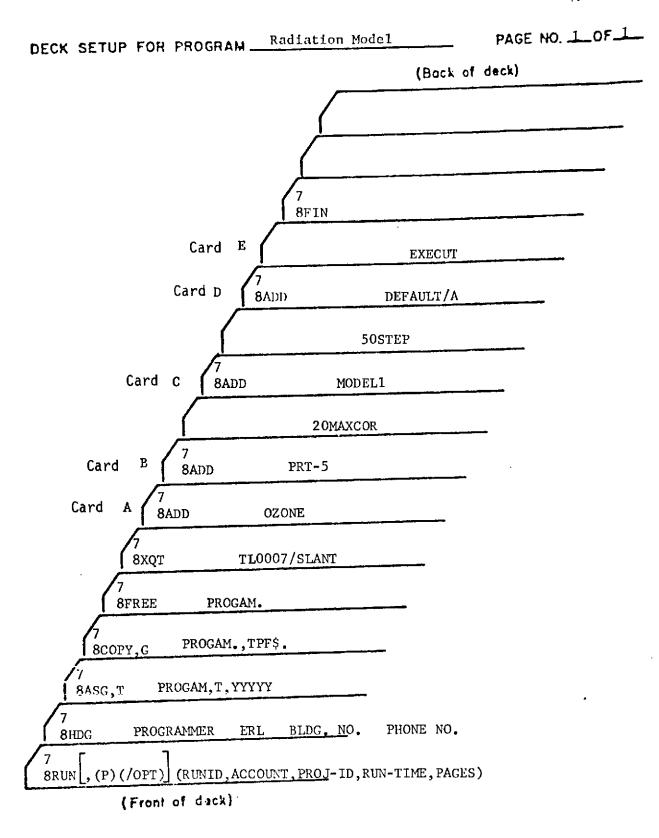


Fig. 5. Example of a Lead Card Setup

Table 3. Card Input and Printer Output Using Card A (Fig. 5).

	Ir	nput				0utpi	ut		
	18F\$,OZGGE				MAVENUPEER) Fit cut
1		RACE			INTERVAL	.0060	B	.1000	WEIGHT
2		.60000-02			575.0- 600.0		.9500	,1000	.2230
3		.60000-62			600.0- 625.0	.0060	.9500	1000	.3010
4		.130001-01			600.0- 625.0	.0130	•9500	.1500	.3160
5		.38999-91			600,0~ 675,0 600,0~ 625,0	.0329 .0590	.9XX.9 .XXX.9	.1500	.1580
6		,500000-01			625.0- 650.0	.0500	9000	.1500	.1620
7		.500000-01			625.0~ 650.0	.0600	.8600	.1700	.3220
8		.600000-01			625.0- 650.0	.0000	.8500	1600	.3180
9		.900000-01			625.0- 650.0	.1200	.8500	.1800	.1970
16		.17(3(3)+(3))			650.0- 675.0	.1256	.8500	.1850	1420
11		.120000000			650.0- 675.0	.1500	.8490	,2000	.3639
12		.15000400			650.0- 675.0	.1850	.0200	2200	.3570
13		18600+00			650.0- 675.0	.1899	.8200	.2290	.1380
14		.189000+00			675.0- 700.0	.2200	.8290	2200	.2240
15		*SS888*00			675.0- 700.0	.3000	.0250	2500	.3629
16		\$00000000 \$50000000			675.0- 700.0	.3600	.8000	.2500	.2779
17		.36000400			675.0- 700.0	.2390	.8350	.2200	.1370
18		.23000+00			700,0- 725,0	.2300	.8309	.2200	.1639
19				.202222000	700.0- 725.0	2000	.6490	.2506	.3030
20		.26000+00			700.0- 725.0	.2850	.8200	2909	.1999
21				.560000+00	700.0- 725.0	,4490	. 8000	2600	.4340
22				,2617(3)+13)	725.0- 750.0	4499	.8000	.2600	.2040
23		.30000+00			725.0- 750.0	3000	.8999	.2200	2020
24				22000000	725.0- 750.0	2000	.eoon	.2250	.4370
25 26				220000400	725.0- 750.0	.2000	.8550	.2299	.1570
27				.240000+00	750.0- 775.0	.1499	.8499	.2400	.2050
24				.240000+000	750.0- 775.0	.1100	.8600	.2400	.4795
29				.24(30):10)	750.0- 775.0	.1199	.8609	.2400	.2350
347				.22(7,7)+(7)	775,0- 800,0	.0900	.0655	.2200	.2450
31	.3150.0+02	. 700000-01	.890000400	,200000+00	775.0- 809.0	.0700	.6990	.2000	.5299
32	.31235+92	700000-01	.89000400	.200000+00	775.0- 800.0	.6769	.6900	.2000	.2359
33	.32245492	,500000-01	900000+000	.160000+00	800.0- 825.0	.0500	.9000	.1800	.2450
34				.15000+00	8 00.0~ 825.0	.0350	.9500	.1500	.5590
35				.150000+000	699.8- 825.9	.0300	.9500	.1599	.1950
36				.11000+90	825,0- 850,0	.6166	.9500	.1199	.3270
37				.10000+00	0,028 -0,658	.6070	.9600	.1000	.5570
38	.33117+92	.70000-02	96000400	.100000400	825. 0- 859.9	.0079	.9600	.1000	.1170
3 9	.38609+92	.35390-01	10400001	.00000	950.0- 975.0	.5353	1.0000	.0000	.6595
40	.38197452	.35300-01	.10900+01	.00000	950.0- 975.0	"G353	1,0000	.0000	.1970
41		10-0000			950,0- 975.0	.0890	.795!3	*00000	.1945
42		.69000-01			975,0-1900,0	.0890	.7950	.0000	,2060
43				10-00096.	975,0-1000,0	.3490	.9120	.5995	.4939
44	.39391+02	,81790+99	.85490+00	.15000+00	975.0-1005.0	.8175	.8540	.1500	.3910
45	.40409+02	.20300+01	.91988	.23500460	1000,0-1025,0	2.6350	.9190	.2350	.4090
46	.49397+92	403900+01	.91500+00	.31005+05	1000.0-1025.0	4.5355	.9150	.3100	.3970
47	.46104+52	.53000.494	.925tk:+t4:	, gandoloradi , gandoloradi	1077,0-1025,0	5.3900	.9250	.3300	.194U
4.5	.41200 70	.52000.51	- Galendaring	177140001EF	1025 0-1050,0	4 3000	esiu.	3366	.2950
40	.41493+92	.48700+01	ំចំវី ទំហូវ។ ល	26600400	1025.0-1050.0	4.8799	.9186	.2661	.4030
50	.41391+02	.33600+01	.85100+00	.26190499	1025.0-1050.0	3.3600	.8510	.2610	.3910
51	.42410+52	.70305+01	,90400+00	34696499	1050,0-1075,0 1050,0-1075,0	7,0300	.9040	.3400	.4100
52	.42397+52	.15599+91	78905+00	20500+00		1,5590 .1849	.7899	.2055	.3970
53	.42194+62	.18400+00	76200+00	0.86500-01 0.86500-01	1050,0-1075,9 1075,0-1100,5		.7625 7620	.5865 6865	.1940
54	.43297+92	.18400+00	.76299+90	.86500-01	1075.G-1100.0	.1840 .0976	.7629 .7290	.9865 .9359	.2070 4030
55	,43403+08	.97650+51	72900,00	35000-01	1075.0-1199.9	.5976	.7290	.0350	.4030 .0190
56	.43019+02	.97600-01	729161416	35000-01	ADIDAGE ALDERED	205.0	*******		:0134

					(N)+(NNNS, TN)+(NH)E8, TO-(NNNB, SO+10128,	28
G161*	0002*	0058,	009U°	0.0215-0.2215	MHINNES, COHINNES, MHINNES, SCHEESS,	T9
GS6E.	*\$\$20	0000	0022,	0.0215-0.5515	00+00015, 00+000047, 00+00008, S0+51588,	238
G717	00ts.	COAT.	0095	0.0215-0.2515	CONTINUES, CONTINUES, CONTINUES, SONDRESS,	64
Gabt.	0002*	0094	(CO)	2120,0-2125,0	CONTINUES, CONTINUES, CONTINUES, SUNDANS,	AT.
GFGF*	noos.	0008*	2600	2100.0-2125.0	CONTRACT CONTROLS (NINCONS, SCHOOSES,	11
2090	0003*	DO91.	0005	0.2515-0.0015	DONDODOS, DONDODAY, DONDODOS, SUNIENSA,	91
0161.	2002,	CC91,	0005*	0.0015-0.2105	00+60005, 00+00007, 00+00064, S0+6e258,	52
0565.	cocs.	0037	0081.	O.COIS-D.270S	(MHCKKIS, CHHINDSY, CHHINDSS, SHALLAES,	72
GPIF*	cocs.	CC67.	0085.	0.0015-0.2105	00+00000. 00+00000. 00+00001. 50+08658.	٤٤
U385.	0005	0081.	COA1.	0.210\$-0.050\$	30+6000. 00+6000. 10-0000. 50+b0bse.	75
0707	000Z,	DUG8*	069O*	0.2103-0.0203	00-00081, 00-00008, 10-00082, S0-60558,	12
C6G2"	6691*	0008*	osso.	0.810\$-0.080\$	00+00081, 00+00008, 10-00088, S0+18118,	GZ.
GIST"	00811	CCC6.	0550"	0.080S-0.8SCS	MARKANS, MARKANS, IN-MASS, SORSEES,	69
D\$6 2 °	000Z*	0008.	CSMO.	0,0505-0,6505	(00+00X)S, 00+(X)0SB, 10-0X0SE, S0+51518,	83
Cale.	0002	0028	0560,	0.0505-0.2505	00+00005, 00+00058, 10-00056, S0+10108,	19
0161.	0002	unse.	.0320	0.2505-0,0005	00000, 00+00002, 10-0024s, 50+66104,	99
0561.	0006*	000\$	255D.	0.2711-0.0211	00000, 00+00000, 10-00165, 50+16504,	59
CT 65.	0000*	0009*	TEEO.	0.2711-0.0211	10-00285, 00+00311, 10-00118, \$0+01838,	1-3
DOIF.	6560,	U917.	1170	0.8711-0.0211	10-0000%, 60+00258, 10-00788, S0+0622%,	62
13900	0610.	OZZ9.	4690"	0.0211-0.6511	OG+OGSOI, OG+OG\$68, CAS+CAOII, SG+EU\$28,	Z9
060 7*	02011	G 769 °	cerr.	0.0211-0.2511	00+005t, 00+0000, 00+00tht, 50+50St.	19
OZOZ.	CPS1.	0606*	CIAI.	0.0211-0.5211	00+00581, 00+00900, 00+00151, S0+60155,	159
0261	C>2 t.	G6G6*	GIPI.	0.2511-0,0011	02+002S1, 00+00S88, 00+00301, SU+19E>>.	6\$
UTEC.	.1550	2566.	0971.	0.8511-0.0011	IG-00588, 00+00064, 00+00254, 50+01558,	85
CASID.	5,6543	0061,	OEAT.	0.0311-0.2501 0.2311-0.0311	10-00012, 00+00587, 10-09869, 50+11664,	45
0176	0150,	CT8T.	8 167,	U CONTO SEUN	Egl cigial Fill star starms — 19 19 19 19 19	

Input				Output		
	JIFE,FRI	-5		_		
1		25AESPONS	PRT-5	WAVENUMBER MIDPOINTS AND FERCENT RESPONSE		
\$	637.5	. ···z		637.5 .0200		
3	662.5	.10		662.5 .1000		
4	687.5	.25		687.5 .2500		
5	712.5	.45		712.5 .4500		
6	737.5	.63		737.5 .6300		
7	762.5	.74		762.5 .7490		
æ	787.5	.78		787.5 .7800		
9	812.5	.83		812.5 ,8300		
10	. 837.5	.91		637.5 ,9100		
11	862.5	.92		862.5 .9233		
12	807,5	.92		887.5 .9200		
13	912.5	.93		912.5 .9300		
14	937.5	.96		937.5 .9600		
15	962.5	.99		962.5 .9900		
16	987.5	1,00		987.5 1,0000		
17	1912.5	.99		1012.5 .99(X)		
18	1937.5	.sa		1037.5 .96(h)		
19	1962.5	.91		1062.5 .9100		
20	1087.5	.86		1987.5 .86GD		
21	1112.5	.62		1112.5 .8200		
22	1137.5	.79		1137.5 .7900		
23	. 1162.5	.76		1162.5 .7600		
24	1107.5	.71 .		1187.5 .7190		
25	1212.5	.56		1212.5 .5670		
26	1237.5	.22		1237.5 .2200		

Table 5. Card Input and Printer Output Using Card C (Fig. 5)

		Inp	ut	
	TAF#.#HICEL	.1		
1		MESSAG		
2	MICCEL NUI	ADUR 1,180	PICAL STORM	AFTER RICHLA1954)
3	19	WATER	METERSKEL	VIN .
4	1513.2	300.2	303.7	•
5	950.0	297,6	301.0	577.
6	900.0	295.3	298.5	1957.
7	850.0	293.1	796.1	1565.
8	890.0	290.3	293.4	2088.
9	750.0	267.3	290.7	2645.
10	700.0	284.7	287.8	3233.
11	659.9	261.2	284.4	3658.
12	600.0	277.8	281.1	4525.
13	\$59.0	274.5	277.5	5239.
14	500,0	271.3	272.9	6010.
15	450.0	265.2	268.5	6847.
16	400.0	259.8	262.3	7763,
17	350.0	253.2	255.9	8778.
18	300,0	244.9	248.2	9916.
19	250.0	234.2	238.5	11215.
20	200.0	221.2	226,5	12734.
21	150.0	373.2	211.0	14577.
22	100.0	373.2	189.2	16950.

				Outpu	t				
HODEL NU	MBER 1,TROP	TCAL STORM A	FTER RIE	HL41954)					
FRESSURE	DEW FOINT	TEMPERATURE	HEIGHT	FRECIP	ATHOS	-CENT	EFFECTIVE	CONSTANT	EFFECTIVE
1013.2	27.0	39.5	FEET	WATER	(0:2	OZONE	FRESSURE	CONCENTRATION	TENTERATURE
950.0	24.4	27.8	1893,0	1.3699	16.4	551	981.6	981.6	302.3
900.0	22,1	25.3	3467.8	2,3621	29.4	.503	957.8	956.6	301.3
650.0	19,9	22.9	5118.9	3,2758	42.4	.004	934.7	931.6	300.2
890.0	17.1	20,2	6850.3	4,1548	55.4	.005	912.6	996.6	299.1
750.0	14.1	17.5	8677.7	4.8383	68.4	.006	691.7	881.6	298.0
700.0	11.5	14.6	10606.8	5,4918	81.4	537	871.9	856.6	297.0
659.6	8,9	11.2	12657.3	6,5645	94.4	008	853.3	831.6	295.9
600.0	4.6	7.9	14845.6	6.5532	107.4	.009	836.3	856.6	294.9
550.0	.8	4.3	17188.1	6.9657	125.4	.610	829.8	781.6	294.0
500.0	-1.9	3	19717.6	7.3229	133,4	.911	89.16.4	756.6	293.1
450 .U	-8.0	-5.2	22463.6	7.64/4	146.4	913	794.0	751.6	292.3
400.0	-13.4	-10.9	25466.9	7.6158	159.4	.014	784.4	<i>r</i> 36.6	291.6
350.0	-20.0	-17.3	26798.9	7.9519	172.4	.015	777.1	681.6	291.0
360.0	-28.3	-25.0	32532.4	8.5374	185.4	.516	772.3	656.6	295.6
250.0	-39.0	-34.7	36794.2	6.0789	198.4	.517	769.7	631.6	290.3
200.0	-52.0	-4G.7	41777.7	8,0938	211.4	.518	768.7	606.6	290.2
150.6	100.0	-62.2	47624.2	8,0941	224.4	.019	768.7	581.6	290.2
100.0	150.0	-84.0	55609.6		237.4	_G20	768.7	556.6	295.2

Table 6. Card Input and Printer Output Using Card D (Fig. 5)

		Input		Output				
					DEFAULTED STRATOSPHERE PROFILES			
					FRESSURE	OZONE	TEN	SPECIFIC
	TPF#.DEFAL	■ T / A					SOUNCING	HUHICITY
1		IDEFAUL			HB	GH/KGH	K	GH/KGH
5	112.4	.36910-06	203.1	.13000-02	112.4	.36910-9	6 293.1	13900-92
3	95.2	.50000-06	205.2	14100-02	95.2	.50000-0	205.2	.14100-92
4	80.8	.900001-06	207.4	.15300-02	80.8	.90000-0	36 257.4	.15300-02
5	68.7	18000-05	209.6	.16500-02	68.7	.18000-0	35 209.6	.16599-92
6	58.5	.25000-05	211.7	17900-02	\$8.5	.25090-9	15 211.7	_17993-52
7	49.6	40000-05	213.9	.19406-02	49.8	.4(%)(%)-4	15 213.9	.19400-92
8	42,6	.50000-05	215.9	.21000-02	42.6	.50000-0	35 215.9	.219000-02
9	36.4	.550000-05	217.9	22600-02	36.4	.55000-0	5 217.9	.22800-02
10	31.2	70000-05	219.9	24700-02	31.2	.700000-0	55 219.9	.24700-02
11	56'8	.800003-05	211.8	26000-02	26.8	.800000	35 211.6	.268001-92
12	23,0	.10000-94	223.8	29(37)-52	23.0	.100000-4	04 223.8	.29000-02
13	19,6	.10000-04	225.8	31400-02	19.6	.10000-	64 225.8	.31400-02
14	17.5	.100000-04	227.8	34100-02	17.0	100001-	64 227.8	.34190-02
	14.7	.10500-04	229.8	36900-02	14.7	.10500-	04 229.8	.369000-02
15	12.7	.10500-04	231.8	400005-02	12.7	.10500-	04 231.8	.49000-02
16		.10599-94	233.7	400001-02	11,0	.10500-	04 233.7	.40000-02
17 18	11,9 9,5	.11000-04	235.7	400000-02	9.5	11999-	04 235.7	.400.00-02
	6.2	.10900-04	238.0	400001-02	8.2	.16906~	04 238.0	.45000-02
19 25	7.2	.105000-04	240.4	40000-02	7.2	.10500-	94 249.4	.49900-92
21	6.2	.10000-04	242.7	40000-02	6.2	.10000-	04 242.7	,40000-02
	5,4	95000-05	245.1	400000-02	5.4		05 245,1	.40000-02
2 2	4.7	.900000-05	247.5	400005-02	4.7		05 247.5	.40000-52
24	4.1	.800000-05	249.8	400000-02	4.1		05 249.8	,4 9000-02
25	3.6	.700000-05	252.3	400000-02	3.6	,79000-	05 252.3	.40000-02
26	3.2	69000-05	254.6	40000-02	3.2	.69000	·05 254.6	.490095-08
27	2.8	.e00000-05	256.9	410000-02	2.8		-05 256.9	.40000-02
28	2.4	.58000-05	259.3	40,000,002	2.4	.58900	-05 259.3	.45500-08
29	2.1	.54000-05	261.7	453331-52	2.1		-05 261.7	.49905-97
34)	1.9	.54000-05	264.1	40(00)-02	1.9		-05 264.1	.40000-02
31	1.6	.450000-05	266.4	400000-02	1.6		-05 266.4	,45XXXXX-5X
32	1.5	.400000-05	268.8	80-00004	1.5		-05 268.8	.490009-93
33	1.3	.38927-05	271.2	400005-02	1,3		-05 271.2	.450000-G
34	1.3	.367777-05	272.1	413737-02	1.3		-05 272.1	,49999-0
34 35	1.0	.350007-05	272.1	417770-02	1.0		-05 272.1	.49000-02

Table 7. Printer Output Using Card E (Fig. 5)

PRESS	SFECIFIC	TEMP	OZCNE	
	HUMICITY	SEUNCIN	C	
MB	GM/KGM	ĸ	GM/KGM	
1013,2	.22232+172	303.70	.46700-07	
963.2	.21449+52	301.56	.46700-07	
913.2	.19865+02	299,14	.46799-97	
862.2	.18317+02	296.73	46700-07	
813.2	.16681+52	294.15	.46799-97	
763.2	.14859+02	291,41	.46755~57	
713,2	.13236+92	288.55	.46790-07	
663,2	.11646+92	285,27	.467!X3-97	
613.2	.10010+92	281.97	.46700-97	
563,2	.64864+91	278,43	.46700-07	
\$13,2	.73121+51	274.56	.46799-97	
463.2	.59384+91	269.26	.46799-57	
413.2	.43936+01	263.75	.46700-07	
363,2	.31067+01	257.54	.46799-97	
313.2	.19737+01	250,15	.46700-07	
263.2	.10564+01	249,93	.46700-07	
213.2	.45184+00	229.51	.46799-97	
163.2	.98410-01	214.87	.46700-07	
113.2	.20772-51	194.56	-	
63,2	.11597-01	210,73	.21775-05	
13.2	.24221-02	231.30	.10500-04	

MODEL NUMBER 1, TROPICAL STORM AFTER RIGHLA1954)

	WATER		HUM
PRESSURE	FRECTP	HEIGHT	SPE
SURFACE	TENFERATI	JRE 303.	7
ANGLE	.D DEGREE	S FROM N	ADIR
PK (-2			

PRESSURE	FRECIP	HEIGHT	SPECIFIC	TEMP	CORRECTION
	WATER		HUMICITY	SOUNDING	
MB	СН	FT	GM/KGM	K	K
963.2	1,0943	1491.5	.21449+02	301.56	.23
913.2	2.1978	3949.2	.19865+52	299.14	.77
663.2	3.5424	4679,9	.18317+52	296.73	1.52
613.2	3.8934	6391.6	.16681+92	294.15	2.40
763.2	4,6515	8193.6	.14859+52	291.41	3.36
713.2	5.3268	19097.6	.13236+02	288.55	4.36
663.2	5.9215	12116.5	.11646+52	265.27	5.4≤
613.2	6.4317	14255 5	1133101405	281 07	6,5/1
563.2	6.8647	16569.5	.84864+91	278.43	7.56
\$13.2	7.2378	19049.3	.73121+01	274.96	8.66
463.2	7.5498	21735.8	.59384+01	269.26	9.76
413.2	7.7649	24679.9	.43936+01	263.75	19,80
363.2	7,9234	27907.8	.31067+91	257.54	11.77
313,2	8.0241	31526.3	.19737+01	250.15	12.67
263.2	8,6789	35634.2	.10564+01	249,93	13.49
213.2	8,1011	40399.4	.45184+00	229.51	14.27
163.2	8.1061	46197.9	.98410-01	214.87	15.53
113.2	8.1072	\$3306.8	.25772-61	194.56	15.86
63.2	8,1578	64660.8	.11597-51	215.73	17.35
13.2	8,1079	97933.5	.24221-02	231.39	20,45

MODEL NUMBER 1, TROPICAL STORM AFTER RICHL(1954)

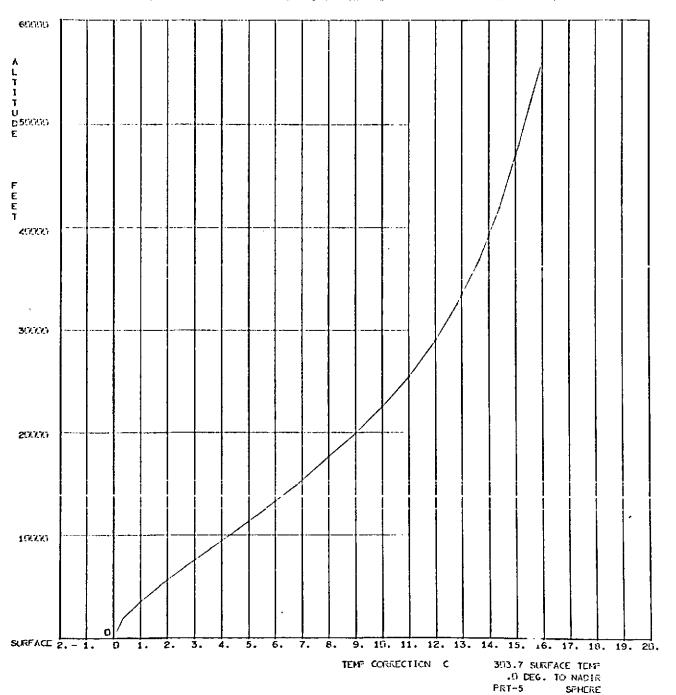
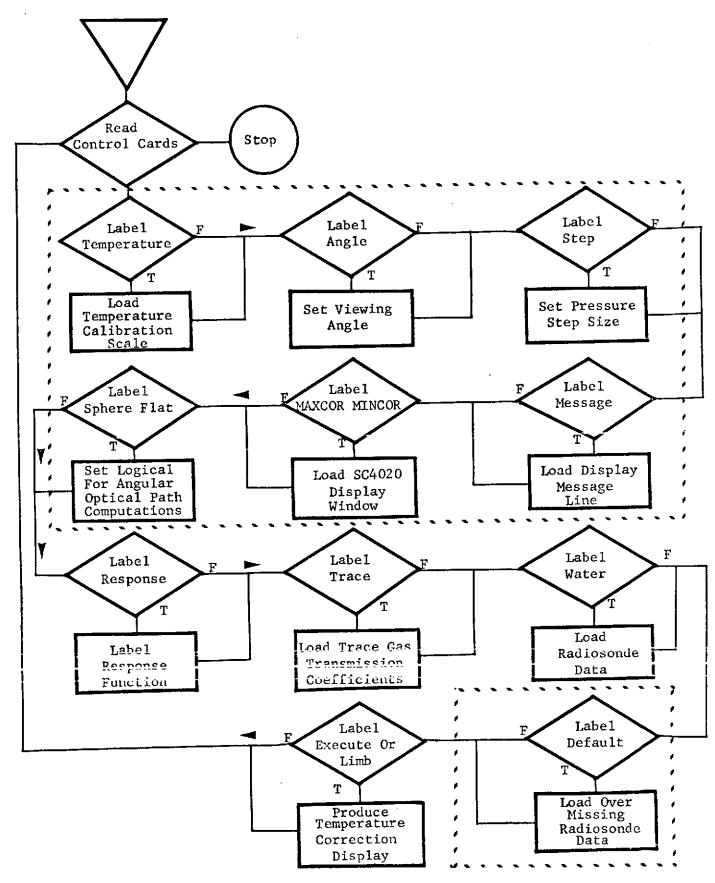


Fig. 6. Film Output Using Card E (Fig. 5).



Dashed line encloses optional functions not needed for program execution.

Fig. 7. Program Control Flown Chart 1.

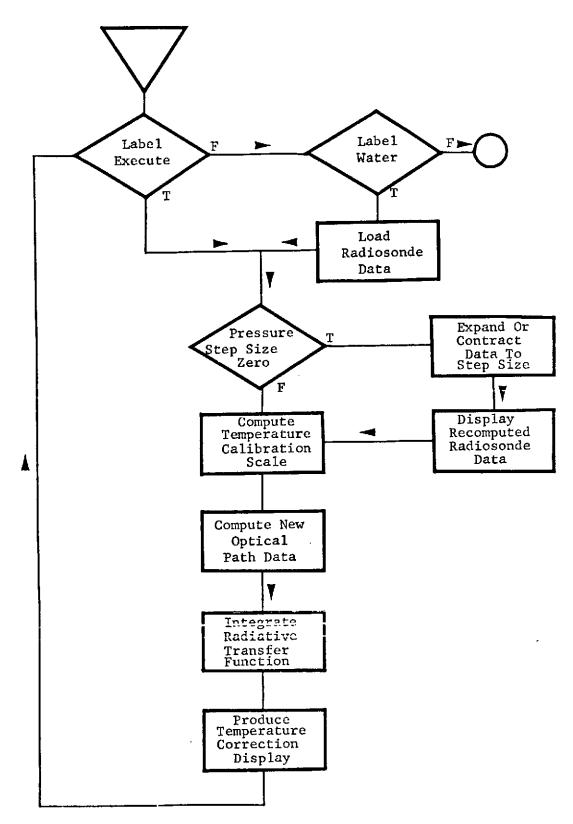


Fig. 8. Program Control Flow Chart 2.

Program Listing

_					90.00		SIZE-FRE,TEX		F 1 00	IN BEEMONE	LOCATION
D	NAME VAPRES	VERSION SLANT	TYPE SYNDOLIC	DATE 17 JUL 73	TIME 11:01:55	5EQ 1		5 5	0	1	1792
Ī	TENTAB	SLANT	SYMBOLIC	17 JUL 73	11:51:42	z	1		G	1	1797
	COEF	SLANT	SYMDOLIC	17 JUL 73	11'01'58	3	. 2	8 5	O	1	1613
	TRANS	SLANT	SYMBOLIC	17 JUL 73	11'01'47	4	2	6 5	G	1	1841
*	HAIN	SLANT	SYMBOLIC	17 JUL 73	11'02'05	5	12		G	1	1867
*	MAIN	SLANT1	SYMBOLIC	17 JUL 75	11.03.10	6	12		0	1	1995
*	RADHOD	SLANT1	SYMBOLIC	17 JUL 73	11.02.59	7		5 5	0	1	2121
*	RACHIC	SLANT	SYMBOLIC	17 JUL 73	11'01'51	9	2 56		O	1	2146 2173
*	TL0007	SLANT	ABSOLUTE	17 JUL 73 17 JUL 73	11 '02 '54 11 '03 '59	19	54				2736
-	TLGCCO7 VAPRES	SLANT1	AESCLUTE RELOCATABLE	17 JUL 73	11 '01 '57	11	1	4			3282
-	TEMTAB		RELOCATABLE	17 JUL 73	11.01.44	12	1	8			3287
	COEF		RELOCATABLE	17 JUL 73	11'01'59	13	1 2	.0			3296
	TRANS		RELOCATABLE	17 JUL 73	11:01:49	14	2 8	:O			3317
	MODEL1		ELT SYME	15 SEP 72	15'36'21	15		7 5	0	1	3339
	MODEL 2		ELT SYMB	15 SEP 72	15:36:22	16		7 5	D	1	3346
	MODEL 3		ELT SYMB	15 SEF 72	15.36.53	17		7 5	0	1	3353
	HODEL4		ELT SYMB	15 SEP 72	15'36'24	18		7 5	0	1	3369
	MODEL 5		ELT SYMB	23 APR 73	C9'57'13	19		7 5	0	1	3367 3374
	MOCEL6		ELT SYMB	15 SEP 72 15 SEP 72	15:36:25 15:36:25	20 21		7 5	0	1	3381
	MODEL 7 MODEL 8		ELT SYMB	15 SEP 72 17 JUL 73	11'04'11	22	•	11 5	ő	i	3388
	MODELS		ELT SYMB	17 JUL 73	11'04'12	23		7 5	ō	1	3399
	MODELS		ELT SYMB	17 JUL 73	11.04.15	24		6 5	0	1	3406
	MODE11		ELT SYMB	17 JUL 73	11'04'12	25		8 5	D	1	3412
	HOCE 12		ELT SYHB	17 JUL 73	11'04'12	26	1	.1 5	O	1	3429
	MCCE13		ELT SYMB	17 JUL 73	11:04:13	27		8 5	B	1	3431
	OZCHE		ELT SYMB	G7 APR 73	09.59.10	28	1	4 5	D	1	3439
	FRT-5		ELT SYME	09 JUN 72	15.20,15	29		4 5	D	1	3463
	R\$-18	8-15	ELT SYMB	15 SEP 72	15'36'39	30		4 5	0	1	3467 3 471
	CEFAULT	Ā	ELT SYMB	31 JUL 73	09:35:21 09:35:20	31 32		0 5	0	1	3481
_	CEFAULT	B	ELT SYMB SYMDOLIC	31 JUL 73 31 JUL 73	09:35:42	33		7 5	0	1	3491
*	RADMIC RADMIC	SLANT	RELOCATABLE	31 JUL 73	09135144	34		13	-	-	3518
	TRANS	SLANT1	SYMPOULIC	31 JUL 73	D9:35:49	35		26 5	O	1	3533
	TRANS	CENTIL.	RELOCATABLE	31 JUL 73	09:35:51	36	2	20			3559
*	TRANS	SLANT	SYMBOLIC	31 JUL 73	09:35:53	37	:	26 5	0	1	3581
*	TRANS		RELOCATABLE	31 JUL 73	09135155	38		20			3607
*	MAIN	SLANT	SYMBOLIC	31 JUL 73	59:35:58	39		53 5	D	1	3629
*	MAIN		RELOCATABLE	31 JUL 73	09:36:04	49	4 1	10	_		3762
	RADMAP	SLANT	MAP SYMB	31 JUL 73	09:36:05	41		2 5 51	0	1	3956 3958
•	TL0007	SLANT	ABSOLUTE	31 JUL 73	09:36:24 09:36:27	42 43	_	26 5	0	1	4509
*	TRANS TRANS	SLANT1	SYMBOLIC RELOCATABLE	31 JUL 73 31 JUL 73	09:36:30	44		20	_	•	4535
•	RADMID	SLANT1	SYMPOLIC	31 JUL 73	09.36.35	45		25 5	0	1	4557
*	RADMOD	324111	RELOCATABLE		09:36:34	46	2	9			4582
*	MAIN	SLANT1	SYMDOLIC	31 JUL 73	09136139	47	1	32 5	0	1	4593
*	MAIN		RELOCATABLE	31 JUL 73	09'36'45	48	3	97			4725
*	TL5007	SLANT1	ABSOLUTE	31 JUL 73	09:37:04	49	5	56 ·			4825
	RACHIOD	SLANT	SYMBOLIC	20 AUG 73	18:55:57	50		27 5	0	1	5381
•	RADMOD		RELOCATABLE		18150110	51		13 20 5	0	•	5498 5493
	TRANS	SLANT	SYMBOLIC	20 AUG 73	18150111 18150113	52 53		26 5 20	u	1	5423 5449
*		431 4441	RELOCATABLE.	21 AUL 13	19 39 13	23 34	-	5 5	ō	i	5ail
	VAFRES	SLANI	RELOCATABLE	-	18155116	55	1	4	_	-	5476
	TEHTAB	SLANT	SYMBOL IC	20 AUG 73	18:55:17	56		16 5	0	1	5481
	TENTAB		RELOCATABLE	20 AUG 73	18150119	57	1	8			5497
	COEF	SLANT	SYMBOLIC	29 AUG 73	18150119	58		28 5	0	1	5506
	COEF		RELOCATABLE		18150121	59		20	_		5534
	MAIN	SLANT	SYMPOLIC	20 AUG 73	18150123	60		35 5	0	1	5555
*			RELOCATABLE		18:50:31	61		42 D1			5690 5836
	11.0007	SLANT	ABSOLUTE	20 AUG 73	18150147 18150148	€2 63		01 26 5		1	6437
	TRANS	SLANT:	SYMBOLIC RELOCATABLE	29 AUG 73	18'50'40	64		20 J		•	6463
	TRANS RACHOD	SLANT1	SYMBOL IC	20 AUG 73	18:50:52	65		25 5	0	1	6485
	RADHOD	350111A	RELOCATABLE		18:50:54	66		9			6510
	MAIN	SLANTI	SYMECLIC	20 AUG 73	18:50:56	67			0	1	6521
	MAIN		RELOCATABLE		18151193	58	3	97			6653
	TL0097	SLANT1	ABSOLUTE	29 AUG 73	18'51'21	69		54			6753
	TEST1		ELT SYMB	20 AUG 73	18:51:22	70	•	3 :	. 0	1	73:07
N	EXT AVAILABLE	LOCATION-									7310

FOR 9%L-08/20-18/50 #0.00

MAIN PROGRAM

STORAGE USED: CODER1) (RI2347 DATARD) DOST64 BLANK CORMINAZ) DOSKRO

COMMON BLOCKS!

0003 21 001464 0004 22 002570 0005 23 000005

EXTERNAL REFERENCES MELCCK, NAME)

DOGG VAFRES 0507 TAPLOT 0010 IDERMY 0011 GRIDIV 0015 PLINC 0013 FLTERM 0014 TABTEM 0015 RADHOD 0016 LINEY 0017 NXV 0020 NYV 0021 NINTES 0022 1FiCUS 0023 NICES 0024 **Nucus** 0025 N1015 0026 ALOG 0027 NSTCP\$ 0030 NERR3\$ 0031 ASIN 0032 SIN 0033 SORT 0034 NERR4\$

STORAGE ASSIGNMENT MELOCK, TYPE, RELATIVE LOCATION, NAME)

0001 0001 0000 0000 0000 0001 0001 000	002044 10L 002223 10526 000223 12F 000315 16F 000354 21F 000354 21F 000313 3006 000514 35F 000737 4726 001134 5546 000104 4700L 001032 740L	5000 5000 5001 5001 5001 5001 5001 5001	000576 10L 002277 10706 099575 12F 006320 17F 000363 22F 000267 2646 020132 30GL 002272 40L 002104 5L 000771 710L 000771 710L 0006771 710L	0000 0000 0000 0000 0000 0001 0001 000	002161 10L 000351 11F 000332 13F 000334 18F 000414 23F 000427 27F 900441 31F 900705 40GL 000722 50GL 001236 607G 901024 720L 001174 80GL	9001 990013 1000 6000 900220 11F 6000 900240 14F 9000 900344 19F 9000 900416 24F 9000 900431 28F 9000 900465 32F 9001 900640 4300 9001 901037 5246 9001 901267 6266 9001 901514 7216	0001 901403 1100L 0000 901403 1196 0001 000629 200L 0000 900422 25F 0000 900433 29F 0000 900506 33F 0001 900643 4356 0001 901123 5450 9001 901127 5450 9001 901027 730L 0001 901307 815L	
0003 R	DOGOOD ADSOR	_	090620 ABSOR		R SS132D ABSORD	0001 001366 810L	0 001001 013	

```
D905 R 000001 ANGLE
                        0004 R 000764 ATCENT
                                                 0000 R 000200 BEGIN
                                                                          0004 R 001750 CFRESS
                                                                                                  0004 I 002260 DEFAUL
                                                                                                  0000 R 000145 DEWET
                                                                          0000 R 000146 DEWENT
                                                 0000 R 000153 DEWAYS
00034 R 001440 CELTRA
                        00000 R 000126 CEST
0004 R 001604 EFRESS
                         0004 R 00211; ETEMPS
                                                 00000 R 000143 EMICLE
                                                                          0003 R 001019 EXPOND
                                                                                                  0003 R 000144 EXPON
                                                 0000 R 000201 FINIS
                                                                          0000 R 000155 FUNCTI
                                                                                                  5550 R 550137 HEAD1
0003 R 000632 EXPONC
                         9993 R 991154 EXPOND
                                                                          COGA R DOGASA HEIGHT
                                                                                                  00000 R 000160 HIGH
00001 R 000140 HEADS
                         G0000 R 000141 HEAD3
                                                 50000 R 0000157 HEIGHS
                                                 9999 R 099174 HUNDE
                                                                          0000 I 000135 I
                                                                                                  0000 I 000161 IHIGH
0004 R 000620 HUM
                         DOWN R DWILS4 HUNIO
                                                 0000 000702 INJES
                                                                          00000 5000711 INJES
                                                                                                  0000 000676 INJF$
0000 I 000176 II
                         00000 - 500664 INJP$
                                                                          00000 R 0000000 INTERV
                                                                                                  9009 I 900156 J
DUDD 000672 INJES
                         0000 1 000072 INSTR
                                                 0003 R 000310 INTER
0000 I 000162 K
                         133A1 61000136 LASSI
                                                 50000 R 5000001 LEADER
                                                                          0005 I 000004 LEVELS
                                                                                                  0000 R 000004 LIMB
                                                 9000 I 900215 LCCSIZ
                                                                          0000 I 000056 MESSAG
                                                                                                  0000 I 000070 NAME
DOOS I DEEDEN LIMIT
                         0000 I 000213 LCCINT
                                                                          GOOM R GO2424 OZONE
                                                                                                   5060 R 506172 OZCNER
0017 1 0000000 NXV
                         AAN GOOCOGG I GAGG
                                                 0004 R 001130 OTCENT
DUNI R CHANTES OZCINES
                         DOWN R SCHOOLSE PART
                                                 DOWN R DOWNSUM PARTI
                                                                          0000 R 000205 FART2
                                                                                                   0000 R 000206 PART3
                                                 0004 R 000000 PRESS
                                                                          0000 R 000171 FRESSP
                                                                                                  0000 R 000152 PRESUR
OCCUDE COMPANY PARTA
                         DONO R SWG133 FHINE
                                                                          00000 R 900211 SLOPEA
                                                                                                   0000 R 000212 SLOPER
0000 R 900214 PREWAN
                         CKR03 R CKR0454 RESPON
                                                 DOOS L DOOXXXX SHELL
0001 R 001663 SPHERE
                         GOOD R DAWGOOD SPHERE
                                                 DOWN R 0000132 STEPSZ
                                                                          9004 R 600319 TEMPER
                                                                                                   5000 R 500151 TEMPOR
                                                 0000 R 000164 TEME2
                                                                          0001 R 001720 TERP
                                                                                                   0000 R 000215 TERF
                         0000 R 500163 TEMP1
DOOR R CODITS TEMPRE
                                                                                                   0000 R 000144 TWHOLE
0000 R 000203 TEST
                         OCCIS R GOODCO2 THETA
                                                 0000 R 000134 TRANCE
                                                                          0004 R 901274 TRANSM
00000 R 000147 VAPER
                         GOOG R GOODWAY VAPRES
                                                 0004 R 000144 WATER
                                                                          DOWN R DWG177 WEIGH
                                                                                                   0003 R 000644 WEIGHT
                                                 00000 R 000165 XP
                                                                          DOOD R 000170 Y
                                                                                                   0000 R 000166 YP
                         0000 R 000167 X
0000 R 000142 WHILE
```

```
00101
                      COMPILER CDATA = SHORT)
          1*
00103
          2*
                      EXTERNAL VAPRES
00105
                      REAL INTERV
00106
                      REAL INTER
          4#
00107
          54
                      REAL LEADER
00110
                      REAL LIMB
00111
          7¢
                      LOGICAL SHELL
                      PARAMETER SIZTRA=100
00112
          8*
00113
          94
                      PARAMETER SIZETH=150
                                   ABSCRUSIZTRA), EXPONUSIZTRA), INTERUSIZTRA),
00114
         10#
                      COMMON/Z1/
                                   RESPONDSIZTRA), ABSORCA10), EXPONCA10),
00114
         114
00114
         12*
                                   WEIGHTUSIZTRA), EXPONDUSIZTRA), EXPONDUSIZTRA),
00114
                                    ABSOROMS IZTRA)
         13#
                                   FRESSASIZETH), WATERASIZETH), TEMPERASIZETH),
                      COMMON/22/
00115
         14#
                                   HEIGHTASIZETH), HUMASIZETH), ATCENTASIZETH),
00115
         15*
                                    OTCENTASIZETH), TRANSMISIZETH), DELTRAASIZETH),
00115
         16+
                                   EPRESSASIZETH), CPRESSAS(ZETH), ETEMPSAS(ZETH),
00115
         17*
                                    DEFAULASIZPIH), OZONEKSIZPIH)
00115
         18#
                                             ANGLE,
                                                        THETA.
                                                                   SHELL,
                                                                             LEVELS
00116
                      COMMON/Z3/
                                   LIMIT.
         19*
                      INTEGER DEFAUL
00117
         20*
00120
         21#
                      DIMENSION LEADER 43)
00121
                      DIMENSION LIMEA42)
         22¢
                      DIMENSION MESSAGATO)
00122
         23#
00123
                      DIMENSION NAME = 2) , INSTRAZE)
         24#
                      DINENSIUN DESIGN
W124
         404
                      DATA SHELL/.TRUE./
COLES
         264
00127
                      DATA AMIN/-2.0/
         27#
                      DATA AMAX/11.0/
00131
         28#
                      DATA STEPSZ/D.0/
00133
         29#
                      DATA NAME/"J HALBACH"/,DEST/"MTF-CLD 1155"/,FHONE/"2146"/
00135
          30×
                      DATA INSTRICTOR HARD COPY - ONE MICROFILM - PLOT TO EOFILE - T-020
00141
         31 ¢
00141
         32¢
                     **/
                      DATA TRANSE/190./
DO143
          33*
                      DATARTEMPERGI), I=1, SIZPTH) /SIZPTH#9000./
00145
          34
```

```
DATAGOZCHEGI), I=1, SIZPTH)/SIZPTH44.67E-8/
00147
         354
               c
00147
         364
00147
         37#
               c
                     COMPUTE RADIANS FROM ANGLES
               c
00147
         38¢
                     RADMANG) = ANG/57.29578
00151
         39±
00151
         4.14
               c
                      CONFUTE SPECIFIC HUMIDITY FROM PRESSURE AND VAPOR PRESSURE
00151
         41+
               c
00151
         42¢
               c
00152
         434
                      RATMIX4V,F)=G22.4V/4F-4.378+V))
GU1 52
         444
               c
                      COMPUTE THE INDEX OF REFRACTION OF WATER-VAPOR AT THE TEMPERATURE
00152
         454
               C
00152
         46.7
               C
                      AND FRESSURE OF A GIVEN LEVEL
00152
         47#
               c
                      REFRAXaL1) = 1 .+ a77 .526E-6) 4FRESSaL1) / TENFERaL1)
00153
         484
00154
         49¢
                      CALL TAFLOTHIHM)
                      CALL IDERMYGNAME, DEST, PHONE, INSTRI
00155
         5.7.¢
               103
                      CONTINUE
00156
         51 a
00156
         52≑
                C
                      INFUT CONTROL CAROS
00156
         53¢
                C
                c
001156
         544
                      READIS, 11, END-500) LIMIT, LABEL, HEAD1, HEAD2, HEAD3
00157
         55*
                c
00157
          56*
00157
                      SET FLAGS TO ADJUST PRECIPITATELE WATER COMPUTATIONS FOR
         57±
               c
00157
          58≎
                c
                      REFRACTION AT HIGH ALTITUDES
00157
          59¢
                c
                      IFOLADOL . EQ. "SPHERE") SHOLL= . TRUE .
00166
         6.0
                      IF GLABEL.EQ. "FLAT ") SHOLL=.FALSE.
00170
          61#
00170
          6::+
                c
                      ADJUST DISPLAY WIRKOW ON THE SC-4020 PLOTS
00170
         63¢
                c
QU: 7G
          64*
                c
00172
                      IFMLADEL .EQ. "MAXCOR") AMAX=LIMIT
          65
                      IFELADOL.EQ. "MINCOK") AMINHLIMIT
00174
          66*
00174
          67#
                c
00174
          68*
                      INFUT THE ANGLE OF CESERVATION
DO174
          69≠
                c
                      IFALABEL.EQ. "ANGLE ") ANGLE=LIMIT/10.
00176
          7.4
00176
                c
          71*
                      INPUT RESPONSE FUNCTIONS
00176
          72*
                c
00176
          734
                C
                      IFALABEL.EQ. "RESPON") GO TO 200
          74¢
00200
                c
00200
         75≑
                      INPUT RADIOSCNOE DATA
00200
          76*
                c
          774
00200
                      IF LABEL . EQ. "WATER ") GO TO 350
00202
          78*
                c
00202
          79≠
                      INPUT TEMPERATURE RANGE OF 190 POINT TABLE
00202
          8C#
                ¢
00202
          81#
                       IFILABEL . EQ. "TEMPER") GO TO 400
00204
          82#
GG2G4
          634
                c
                       MENT PENALS LINES DESCRIPTING CONTUT
          544
55254
                c
00204
          €5#
                      IFELABEL.EQ. "MESSAG") GO TO 600
90206
          86≄
                c
00206
          87×
                      COMPUTE A LINE FUNCTION TO 50 DEGREES CENTERED AT A GIVEN NADIR
00206
          884
                c
          89*
                ¢
                       ANGLE
 00206
                c
 00206
          90*
                       IFALABEL.EQ. "LING ") GO TO 700
 00210
```

```
00210
              c
        924
                     RECORD A PRESSURE INCREMENT TO ESTABLISH THE STEP SIZE FOR RADIOSCADE
00210
        93#
              ¢
00210
         94¢
              c
                     DATA FROM THE SURFACE TO ONE MILLIDAR
00210
        954
              c
00212
         964
                     IFALABEL.EQ. "STEP ") STEPSZ=LIMIT
09212
         970
              ς
                     OVER-WRITE MISSING RADIOSCHOE DATA TO SATELLITE ALTITUDE WITH DEFAULT
00212
        984
              c
GG212
        99#
              ¢
                     CATA
00212
       190*
              c
                     IFALAGEL.EQ.*CEFAUL*) GO TO 800
00214
        1014
00214
        102*
                     INFUT SPECIAL TRACE GAS TRANSMISSION FUNCTIONS
00214
        153≄
              c
00214
        104#
              C
00216
        1054
                     IF aLABEL .EQ. "TRACE") GO TO 1193
                     60 TO 150
00220
        1064
                     CONTINUE
00221
        1674 300
00221
        108+
              C
00221
        109#
                     SET OBSERVATION ANGLE
              c
00221
        1.1 Cox
              c
00222
        1114
                     THETA=RADHANGLE)
00222
        112*
                     INITIALIZE PRECIPITABLE WATER COMPUTATION
D0222
        1134
              c
00222
        114+
               c
                     WHOLE=0.
00553
        115≠
00223
        116#
              C
00223
        1174
                     INITIALIZE EFFECTIVE PRESSURE COMPUTATION
00553
        118#
                     EMHOLE=0
00224
        1194
00224
        12.0
              c
00224
                     INITIALIZE EFFECTIVE TEMPERATURE COMPUTATION
        1214
00224
        122# C
00225
        1234
                     THE EST.
00225
        124#
                     INFUT SURFACE RADIOSONCE DATA
00225
        125≉
              C
00225
        126*
              c
00226
                     READA5,12) FRESSa1), DEVPT, TEMPERa1), HEIGHTa1), OZCNEA1)
        127#
                     CEFAULat) =0
00235
        128#
                     IFAHEAD2.NE. "KELVIN") DEWFT=DEWFT+273.16
00236
        129*
                     IFOHEACZ.NE. "KELVIN") TEMPERAL) = TEMPERAL) +273.16
00240
        130%
                     IFAHEAD3.NE. "OZCNE") OZCNEA1)=4.67E-8
00242
        131#
                     IFAHEAD3.NE. "OZONE ") FLDa2,1,DEFAULa1))=1
00244
        1324
00246
        133*
                     DEWENT=CEWET
00246
        134# C
                     COMPUTE SURFACE VAPOR FRESSURE
00246
        135#
              c
00246
        136#
               ¢
                     VAFER=VAPRESACEWPT)
00247
        137#
               c
00247
        136*
                     USE DEW-POINT GREATER THAN 77 DEGREES TO ASSUME 10 PERCENT
00247
        139+
                     RELATIVE HUMIDITY
00247
        140*
               c
00247
        141#
               C
                     IF@CEWFT.GE.350.) VAPER=VAPRES@TEMFER@1))#.1
00250
        142‡
                     IFADEWFT.GE.350.) FLCa3,1,DEFAULa1))=1
00252
        1434
00252
        144*
               c
                     COMPUTE THE SURFACE SPECIFIC HUMIDITY
00252
        145*
00252
        146≠
               c
                     PART=RATHIXQVAFER, FRESSQ1))
00254
        147#
00254
        146¢
```

```
DU254
       149#
              ¢
                     STORE THE SPECIFIC HUMIDITY COMPUTED AT THE SURFACE
OX)254
       1504
               c
CA)255
        151+
                     MLMg11:PART
0.0255
        152#
                     THE ATMOS-CENTINCTERS OF CARBON DIOXIDE AND OZONE AT THE SURFACE
0.0235
        153*
               c
CG255
        154*
               c
                     ATCENTAL)=0.
CO256
       1554
                     OTCENTal)=9.
CO257
        156#
T0257
        157≄
                     THE EFFECTIVE PRESSURE AT THE SURFACE IS EQUAL TO THE RADIOSCHIDE
        158*
00257
               ¢
                     SURFACE FRESSURE
00257
        159a
               C
0.0257
        1600
               c
                     EFRESS(1)=FRESS(1)
00200
        161#
                     CPRESSA1):PRESSA1)
CG261
        162#
00261
        163+
                     LABEL THIS PAGE OF ABSORBING GAS CONCENTRATIONS.
        164*
               C
DC:261
00261
        165≑
00268
        166*
                     WRITE46,27) @MESSAG@[],[=1,19)
        167¢
                     DEWFT=DEWFT-273.16
0.3270
                      TEMPOR: TEMPERat) -273.16
00271
        168*
CK7272
        169$
                      WRITE@6,14) FRESSALL) DEWPT, TEMPOR
                      DO 15 1=2,L1MIT
(I)277
        170¢
00277
        1714
               c
00277
        172#
                      EXTRACT A LEVEL®S DATA
00277
        173#
                      READAS, 12) PRESSAI), DEVPT, TEMPERAI), HEIGHTAI), OZONEAI)
00392
        174#
00311
         175#
                      DEFAULal)=9
               C
00311
        1764
                      CONVERT HEIGHT TO FEET IF NEEDED
00311
        177#
               C
00311
         178#
                c
                      HADEACT.EQ. "METERS") HEIGHTAT) = HEIGHTAT) = 3.2808
21400
        179+
00312
        185⇔
                      COMPUTE AVERAGE PRESSURE OF A LAYER
 00312
         181#
                c
00312
         182*
                      FRESUR=aFRESSal)+FRESSal-1))/2.
 OD314
         183*
 00314
         184#
                Ç
         165#
                c
                      CONVERT FROM CENTIGRADE TO KELVIN IF NEEDED
00314
         186+
 00314
                C
                      IFWHEAC2.NE. "KELVIN") DEWPT=DEWPT+273.16
 00315
         1874
                      IF CHEADS.NE. "KELVIN") TELFER (1) = TEMPER (1) +273.16
 00317
         188¢
 0.317
         189*
                      IMPOSE A CONSTANT OZONE PROFILE IF NEEDED
 00317
         190≠
                C
 00317
         191¢
                      IFWHEACS.NE. "OZONE") OZONEW1) =4.67E-8
 00321
         192*
                      IFAHEAD3.NE. "OZONE ") FLDa2,1,DEFAULa1))=1
 00323
         193#
 00323
         194#
                      COMPUTE THE AVERAGE LAYER CEW POINT
 00323
         195#
 00323
         196#
                C
                      DEMANGE ADDIENT+DELET) /2.
 O)1325
         197*
                c
 00325
         198±
                      COMPUTE THE VAFOR FRESSURE
         199#
 00325
         2004
 00325
                       VAFER=VAFRESaceWAVG)
 00326
         201*
         202#
 00326
         203# C
                       USE DEW-POINT GREATER THAN 77 DEGREES TO ASSUME 10 FERCENT
 00326
                      RELATIVE HUMICITY
 D0326
         204 ¢ C
         205≠⊕ C
 D0326
```

```
IF@CENPT.GE.350.) VAPER=VAPRES@TEMPER@[]) #.1
00327
        206#
                     IF@DEWFT.GE.350,) FLDa3,1,DEFAULa1))=1
09331
        2074
00331
        2084
               c
                     COMPUTE THE MIXING RATIO OF THIS LAYER
003331
        2094
00331
        215+
               c
00223
        211#
                     HUHLD=622.4VAPER/4FRESUR-VAPER)
00333
        212+
                     COMPUTE THE AVERAGE TEMPERATURE OF THIS LAYER
00333
        2134
00333
        214¢
               ¢
00334
        215¢
                     TEMPOR=aTEMPERal)+TEMPERal-1))/2.
00334
        2164
                     COMPUTE THE HEIGHT OF THE TOP OF THIS LAYER IF NEEDED
D0334
        217#
               C
OC 334
        218#
00335
                     IFaHEIGHTAI) .LE.S.)
        219#
                    ##EIGHTaI)=#EIGHTaI-1)+29.3#TEMPOR#ALOGaFRESSaI-1)/PRESSaI))
00335
        225w
OU335
        221#
                     ##41.+.00061##MHD)#3.2808
00335
        2554
               ¢
                     STORE THE SPECIFIC HUMIDITY AT EACH LAYER TOP
00335
        2234
               c
00335
        224#
               c
                     HUMAI)=RATMIXAVAFER, FRESUR)
DU337
        225#
00337
               C
        226#
                     COMPUTE THE PRECIPITABLE WATER AT THIS LEVEL
00337
        2274
00337
        2284
                     WATER (1) - WATER (1-1) + CHUMA(1) + SPHERE (11), (1) + CFRESS(1-1) - FRESS(1)))/
G0340
        229¢
00349
        2304
                     980.
00349
        231¢
                     COMPUTE THE ATMOS-CENTINETERS OF CARDON-DIOXIDE AND OZONE TO THIS
00349
        232¢
               C
00349
        233*
               c
                     LAYER
00349
        234≄
                      ATCENTal)=aFRESSal)-FRESSal))+.260
00341
        235*
                     OTCENTAL) =OTCENTAL-1) +AFRESSAL-1) -FRESSAL)) $40ZONEAL) +OZONEAL-1)) $
00342
        236+
00342
        237±
                     237.968
00342
        238≠
                     COMPUTE THE EFFECTIVE TEMPERATURES AND PRESSURES USED TO RELATE
00342
        239≑
               c
                     HONOGENEOUS FATH TRANSMISSION FUNCTIONS TO INHUMOGENEOUS SLANT
00342
        2494
               c
00342
        241*
                     PATHS THROUGH THE ATMOSPHERE
00342
        242#
                      EWHOLE=EWHOLE+@WATERQI)-WATERQI-1)) #FRESUR
00343
        243#
                      TWHOLE=TWHOLE+GWATERGI)-WATERGI-1))+TENFOR
DD344
        2444
                      CFRESSal)=aPRESSal)+FRESSal))/2.
00345
        245*
                      EFRESSAI)=EWHOLE AWATERAI)
00346
        2464
00347
        247#
                     ETEMPSaI)=TWHOLE AWATERai)
00347
        248≠
                      COMPUTE CENTIGRADE VALUES FOR DISPLAY
00347
        249#
               c
00347
        250*
               C
00350
        251#
                      CEWAVG=DEWFT-273.16
                      TEMPOR=TEMPERal)-273.16
00351
        252#
00351
        253*
                     FRINT INTERNEDIATE RESULTS OF THIS PROCESS
00351
        2544
50001
        2554
                     WRITELG, 13) FRESSAID, DOWAYG, TONFOR, HEIGHTAID, WATERAID, ATCENTAID,
00352
        2564
                     * OTCENTal) , EFRESSal) , CFRESSal) , ETEMFSal)
00352
        257*
                      DEMPNT=DEMPT
00366
        250 $
                      CONTINUE
D0367
        2594
               10
00371
        260*
               11
                      FORMATG119.46.6X.346)
                      FORHAT#1X,F7.1,2X,F6.1,4X,F7.1,3X,F10.1,E10.5)
               12
0.1372
        261*
                      FORMATG1X,F7.1,2X,F6.1,4X,F7.1,3X,F1B.1,1X,F7.4,1X,F6.1,F6.3,2X,
00373
        262¢
               13
```

-01

```
00373
       263¢
                    #6.1.
00373
                    *6x,F6.1,6x,F5.1)
        264*
00374
                     FORMATA! PRESSURE DEW POINT TEMPERATURE HEIGHT PRECIP ATMOS-CE
        265#
                    #NT EFFECTIVE CONSTANT EFFECTIVE",/, " ",F7.1,2x,F6.1,4x,F7.1
00374
        266*
G/1374
        2674
                                      WAVER COME OZONE PRESSURE CONCENTRATION TEMP
00374
                    WERATURE")
        268+
00375
        2694
               15
                     FCRMATUF7.1 .F7.4)
00376
        2754
                     FORMAT#1X,F7.1,F7.4)
00377
                     FORMATATH ANGLE ,F4.1,20H DEGREES FROM NADIR ,7,20H SURFACE TEMPER
        271+
               17
                    *ATURE.F7.1)
00377
        272#
00400
        273¢
                     FORMATMIX, 36HTEMPERATURE RANGE OF 1933 POINT TABLE)
00491
        2744
                     FORMATA 42HIWAVENUMBER MIDFOINTS AND FERCENT RESPONSE)
               19
                     FORMATA 37HITEMPERATURE RANGE OF 100 FOINT TABLE)
0034552
        275¢
               21
00103
        276#
               22
                     FORMATASIMMERECIP HEIGHT SPECIFIC TEMP
                                                                         CORRECTION,/,
                                           HUMIDITY SOUNDING, /,
00493
        277#
                    #38H WATER
                    442H CM
                                  FT
                                           GH/KGH
                                                      K
00493
        276¢
00494
        279¢
               23
                     FCRMATalH (3A6)
00495
                     FORMATAF4.1,14H DEG. TO NACIR)
        2804
00496
        2614
               25
                     FORMATOF5.1,13H SURFACE TEMP)
00497
        2824
               26
                     FORMATQ19A6)
00410
        2634
               27
                     FORMATG1H1,15A6,/)-
00411
                     FORMATG4E1().5)
        284#
               28
                     FCRMATa1x,F6.1,"-",F6.1,4a3x,F7.4))
00412
        2454
               29
                     FORMATAIHI,346,/," WAVENUMEER
Q¥13
        2464
                                                        A A A THOS-CENT (CE) OTEP (C) ",/,
00413
                     * INTERVAL
                                       A
                                                            Ç
                                                                       WEIGHT")
        287#
                    FORMATA "DINTERFOLATED LINE FUNCTION TO ",F7.5," FEET ",F5.1,
001414
        2884
               32
                    ** DEGREES FROM NADIR*, 247, 1X, 214F6.2)))
00414
        289*
                     FORMAT41X,F7.1,2X,E10.5,2X,F6.1,2X,E10.5)
00415
        29:34
                     FORMATA" IDEFAULTED STRATCSPHERE FROFILES", /,
                                                                                                 NEW
DC3416
        291 ¢
               35
0.1416
        292*
                            " PRESSURE OZGJÆ
                                                  TD:=
                                                             S-ECIFIC"./.
                                                                                                 NEW
                                                  SOUNDING HUMIDITY",/,
00416
        293¢
                                                                                                 NEW
                            * MB
                                       GM/KGM
                                                             GM/KGM")
00416
        294#
                      CALL GRIDIVE1,-50.,50.,AMIN,AMAX,10.,.5,0,0,1,1,4,4)
00417
        295#
00420
        296×
                     60 TO 199
00420
        297#
                      INPUT RESPONSE FUNCTIONS AS FERCENTAGES AT MICHOINTS OF EACH
00420
        2984
               ¢
00420
        299*
               c
                      INTERVAL
00420
        300a
00421
        301 €
               200
                     CONTINUE
                     LEADERG1) = HEAD1
00422
        302*
00423
                     LEADER42) =HEADS
        3934
00424
        394*
                     LEACER431=HEAC3
                     WRITE@6.19)
00425
        3G5*
00427
        306¢
                      DO 30 I=1,85
                     RESPONATION
00432
        307#
               30
                      DO 40 I=1,LIMIT
00434
        308#
                      READAS, 15) INTERV, FUNCTI
00437
        309#
00443
        310*
                      WRITEGG,16) INTERV, FUNCTI
                      J=4|NTERV-12.5)/25.
00447
        311¢
                      RESHONAU) = FUNCTI
        312#
                      60 TO 1HJ
00452
        313#
00452
        314#
                      INPUT THE TEMPERATURE RANGE OF THE BLACK-BODY INTENSITY/
00452
        315#
               c
                      TEMPERATURE SCALE IN CENTIGRADE
 00452
        316#
00452
        317#
               C
00453
        318#
                400
                      REACES, 15) TRANGE
                      WRITEa6,18)
00456
        319#
```

```
00460
        3204
                     WRITE46,16) TRANCE
00463
                     GO TO 100
        3214
DQ464
        322#
               500
                     CONTINUE
00465
        3234
                     CALL PLIND((G))
                     CALL FLIERM
09466
        3246
00467
        3250
                     STOP
00467
        3264
00467
                     INPUT CISPLAY LABELS
        327¢
               C
00467
        328#
               C
DO470
        329+
               600
                     READ45,26) @MESSAG411, [=1,15)
00476
        330+
                     60 TO 100
DX1476
               c
        331+
                     PRODUCE A LIMB FUNCTION DISPLAY TO 59 DEGREES CENTERED AT THE
03476
        332*
               ¢
00476
               ·c
        333+
                     GIVEN NADIR ANGLE
D0476
        334¢
               C
00477
        335*
               700
                     CONTINUE
00590
        3364
                      HEIGHS=LIMIT
                                                                                                  NEW
00501
                      IFASTEFSZ.GT.O.) CALL STEFER
        3374
                      1F4STEPSZ.GT.O.1 CALL DISFLY
00503
        338*
00503
        339*
               c
                      ESTABLISH A TEMPERATURE/ELACKBODY INTENSITY SCALE
00503
        349<del>*</del>
               c
00503
        341*
               ¢
00505
        3424
                      CALL TABTEMATEMPERALL , TRANGE)
D0506
        343*
                      T=1
00507
        344
               710
                     I=I+1
00507
        345#
               ¢
00507
               c
                      DETERMINE INDEX TO INTERPOLATION LEVELS FROM THE REQUESTED HEIGHT
        346*
00507
        347#
               c
00510
        348#
                      Ifal.GT,100) 60 to 730
                                                                                                  NEW
00512
        349#
                      IFWHETCHS.GE.HEIGHTWI-1).AND.HEIGHS.LE.HEIGHTWI)) GO TO 729
                      IFWHEIGHTall LE.G.) GO TO 730
                                                                                                  NEW
        35.74
00514
                                                                                                  -02
DD)516
                      GO TO 719
        351 a
                                                                                                  NEW
00517
        352#
                720
                     HIGH=HEIGHS
00520
        353¢
                      60 TO 740
                                                                                                  -D1
00520
        354*
               c
                      DATA UNAVAILABLE FOR THE REQUESTED INTERPOLATION
00520
        355¢
                c
00520
        356#
00521
        357*
                730
                      HIGH:HEIGHTaI-1)
00522
                      IHIGH=I-1
        350±
                740
00523
        359*
                      DO 750 K=1,21
00523
        360*
                c
                      COMPUTE THE LIMB ANGLE FROM NADIR IN 5 DEGREE STEPS
00523
        361#
                C
00523
        362*
                c
00526
        363≠
                      LIMBak)=ANGLE-55.+K¢5.
                      THETA=RADaLIMEak))
00527
        364¢
00527
        3654
                c
00527
         366#
                      COMPUTE THE LOWER LAYER TEMPERATURE
00527
        367#
                c
60530
        3664
                      LIMITSIHIGH
55551
         565-
                      CALL COATIG
                      CALL RADINGCUTERFELD
00532
        3704
                      IFELIMIT.EG.1) TEMP1=0.
00533
        371¢
00533
        372*
                      COMPUTE THE UPFER LAYER TEMPERATURE
00533
        373*
                c
00533
        3744
                c
00535
        3754
                      LIMIT=[HIGH+1
                      CALL RADMODATEMES)
00536
        376*
```

```
00536
        377#
                     INTERPOLATE A TEMPERATURE TO THE REQUESTED HEIGHT
00536
        3784
               c
00.1536
        379#
               c
                     LIMBAK+21) = TERFAHEIGHTALIMIT-1) ,HEIGHTALIMIT) ,TEMF1 ,TEMF2 ,HIGH)
G0537
        360*
               750
OO541
        3810
                     WRITER6,32) HIGH, ANGLE, aLIMORK), K=1,42)
                     XP=-50.
0/3551
        3624
00352
        363*
                     YP=O.
00553
        384*
                     00 760 1-1,21
                      X=L1HCa1)
G0556
        3054
G0557
        3864
                      Y=L11@:(1+21)
                      CALL LINEVANXVAXF), NYVAYF), NXVAX), NYVAY))
00560
        367#
00561
        3664
                      XP=X
00562
        3094
               760
                      YF=Y
DG564
        3954
                      GO TO 150
        391#
               800
                     CONTINUE
D0565
00565
        3922
               c
                      READ DEFAULT PROFILES AND INTERPOLATE HISSING DATA
00565
        393#
               ¢
C(1565
        394#
                c
                                                                                                   NEW
                      IFASTEPSZ.GT.G) CALL STEPER
00566
        3954
                                                                                                   NEW
00570
        3964
                      WELTE 46,35)
                      READAS, 33, ENC=100) PRESSP, OZCNEP, TEMPRE, HUMICF
00572
        397#
                                         PRESSP, OZONEP, TEMPRE, HUMICP
OCIGOD)
        3984
                      WRITE46.33)
                      00 820 J=2,LIMIT
ODGD6
        3994
         400¢
                      READIS, 33, END=100) FRESUR, OZONES, TEMPOR, HUNIO
00611
                                         PRESUR, OZONES, TEMPOR, HUMIO
00617
         4014
                      WRITEa6,33)
00617
        402*
                      SCAN REQUESTED LEVELS FOR DEFAULT PRESSURE WINDOW
00617
         493≑
00617
         4944
                      CO 810 I=2, LEVELS
00625
         4054
                      IFUFRESSAID LIT. FRESSF. AND . FRESSAID . GE. FRESUR) GO TO 815
60630
         4063
         497#
00632
                      CO TO 615
                      CONTINUE
         4384
                815
00633
00633
         4094
                ¢
00633
         4104
                Ç
                      INTERPOLATE MISSING TEMPERATURE
00633
         411+
                c
                      IFATEMPERAI).GT.1000.) TEMPERAI)=TERPAPRESSP, FRESUR, TEMPOR,
00634
         412*
                     # FRESSall)
DD634
         413¢
                C
00634
         4144
                      INTERFOLATE MISSING SPECIFIC HUMIDITY
                ¢
00634
         415*
00634
         416#
               ¢
                      IFAFLDA3,1,DEFAULAI)).EQ.1) HUMAI)=TERFAPRESSF,FRESUR,HUMIDF,HUMID
00636
         417#
                     * ,PRESSal))
യങ
         4184
                c
00636
         4194
                      INTERPOLATE MISSING OZONE
00636
         429÷
                C
00636
         421#
                      IFAFLDAZ,1,DEFAULAI)).EQ.1) OZONEAI)=TERFAFRESSP,FRESUR,OZONEP,
         422#
00640
                      ozones.PREssal))
 00649
         423¢
                810
                      CONTINUE
 00642
         424#
 00642
         4254
                c
                      FETCH NEXT LEVEL CEFAULT PARAMETERS
 00642
         4264
                C
         427#
 00642
                      PRESSF=PRESUR
 00644
         428#
                      OZONES = OZONES
 00645
         429*
 00646
         430÷
                       TEMPRE=TEMPOR
         431≄
                       HUMICP=HUMID
 00647
                      CONTINUE
 00650
         432*
                820
 00652
         433¢
                       GO TO 100
```

```
0.1652
        434*
00652
        435*
               c
                      INPUT TRACE GAS TRANSMISSION FUNCTIONS WHERE
00/652
        4364
                     WEIGHT TRUNCATED TO AN INTEGER IS AN INDEX TO THE WAVENUMBER
00652
        4374
               c
                             INTERVAL FOR WHICH THIS ANALYTIC FUNCTION AFFLYS
(X)652
        4384
               c
00652
        4394
                      WEIGHT FRACTION IS THE GEOMETRIC MEAN WEIGHTING MICIFIED BY THE
00652
        440+
               C
                             PLANCKIAN FUNCTION FOR THE WAVE-NUMBER INTERVAL FRACTION
00652
        4414
               C
001632
        442*
                             OF THIS ANALYTIC FUNCTION
00652
        443+
               c
                                       THESE ARE PARAMETERS APPEARING IN ANALYTIC
                      ABSORD # A
00652
        4444
               c
                                       FUNCTIONS OF THE FORM ASMATHOS-CENT#28) #4EF##C)
TXX652
        4454
               c
                      E = CMO9X3
                      EXPOND = C
                                       FOR THE INTERVAL AND WEIGHTING DESCRIBED ABOVE
00652
        4464
00652
        447+
00653
        448*
                1100 CONTINUE
00654
        449*
                      WRITERG, 31) HEAD1 , HEAD2 , HEAD3
                      00 1110 I=1,LIMIT
00461
        4504
                      tFal.67.100) so to 100
00664
        4514
001666
        452+
                      READ#5,28,END#100) WEIGHT#I), ADSORO#[), EXPOND#I), EXPOND#I)
                      II=WEIGHTal)
00674
        453+
                      WEIGHEWEIGHTGI)-II
DU675
        4544
DD676
        455*
                      BEGIN=INTERall)-12.5
                      FINIS-INTERall)+12.5
00677
        456*
                      WRITERS, 29) BEGIN, FINIS, ABSOROUL), EXPONDUL), EXPONDUL), WEIGH
00700
        457*
00710
        450+
                1110 CONTINUE
                      60 TO 100
00712
        459*
                      SUBROUTINE DISPLY
00713
        46C+
00713
        461*
                c
         462*
                      THIS SUBROUTINE DISPLAYS THE MODIFIED DATA BASE
00713
                c
00713
        463*
                      WRITE a6.11)
00716
        4644
                      DO 19 I=1.LEVELS
00720
         465*
00723
         4664
                10
                      WRITE#6,12) PRESS#1), HUM#1), TEMPER#1), OZONE#1)
                                         SPECIFIC TEMP
                                                           OZUNE",/,
                      FORMATA*1FRESS
00732
         467#
                11
                                         HUMIDITY SCUNDING"./.
00732
         468*
                              • MR
                                         GH/KGH
                                                            GM/KGM")
00732
         469*
                                                    K
00733
         470+
                12
                      FQRMATd1X,F7.1,1X,E19.5,2X,F6.2,1X,E19.5)
                      LIMIT=LEVELS
00734
         471#
00735
         4724
                      RETURN
00736
         473*
                      FUNCTION SPHEREC+,L)
00736
         474*
                      THIS IS A CONDITIONAL FUNCTION WHICH MODIFIES THE PRECIPITABLE
00736
         475*
                      WATER AT SATELLITE ALTITUDES FOR THE SPHERICAL SHAPE OF THE
 00736
         476#
                      EARTH
                C
00736
         477*
00736
         478*
                C
 00741
         4794
                       SPHERE:1.
                       IF4.NOT.SHELL) RETURN
00742
         480#
 M742
         481+
                C
                       TEST IS THE SINE OF THE ANGLE OF DESERVATION TO THE HORIZON
 00742
         482*
                c
 00742
         483*
                       TEST=20898696./a20898696.+HE1GHTaL))
 00744
         484*
 00744
         485*
                c
                       NO COMPUTATIONS ARE MADE WHEN THE FIELD OF VIEW IS ABOVE THE
 00744
         486*
                       HORIZON
         487*
                c
 00744
 00744
         488*
                 C
                       IFATHETA.GT.ASINATEST)) RETURNS
 00745
         489*
                c
         490*
 00745
```

```
00745
                     HIGH IS THE AVERAGE HEIGHT OF THE WATER VAFOR LAYER
        4914
               c
00745
        492±
               c
00747
        493÷
                     HIGH-WEIGHTOL) +HEIGHTOL-11)/2.
00747
        4944
                     ADD THE AVERAGE HEIGHT OF THE LAYER TO THE RADIUS OF THE EARTH
G1747
        4954
               C
00747
        496#
               c
                      PART1=HIGH+25898696.
00750
        4974
00759
        4984
               c
00750
        499¢
                      MULTIFLY BY THE HEAN INDEX OF REFRACTION AT THE AVERAGE HEIGHT
00750
        500+
               c
                      OF THIS LAYER
(20759)
        501 to
               C
CC1751
        51724
                      FART2=FART1= AREFRAXOL)+REFRAXOL-1))/2.
00751
        5034
                      MULTIPLY BY THE INDEX OF REFRACTION AT THE HEIGHT OF THE SENSOR
00751
        51)4 a
               C
00751
        505±
               c
                      AND BY THE SINE OF THE ANGLE OF CESERVATION
06751
        5/164
                      PARTS=FART1 +REFRAXOL) +SINGTHETA)
        5074
00752
                      PART4=50RT44FART24FART2)-4FART34FART3))
00753
        50484
0.3753
        509+
                      COMPUTE THE MEAN FUNCTION ASSUMING THE CESERVING SENSOR IS JUST
00753
        519#
               C
                      ABOVE THE MEAN LAYER TO WHICH IT IS APPLIED
00753
        511¢
                c
00753
        512*
                      SPHERE=PART2/PART4
00754
        513¢
                      RETURN
£1755
        514*
00756
         515¢
                      FUNCTION TERPOXI, X2, Y1, Y2, X)
OC1756
         5164
                      THIS FUNCTION FERFORMS LAGRANGIAN INTERPOLATION
00756
         517¢
                c
023756
         518*
                ¢
                      SLOFEA=4X-X2) /4X1-X2)
00761
         519¢
                      SLOPED=aX-X1)/aX2-X1)
00762
         52-#
                      1ENP≃SLOPEA≑Y1+SLOFEEAY2
D07763
         521£
00764
         522#
                      RETURN
00765
         523#
                      SUEROUTINE OPATHS
                c
00765
         524¢
                      THIS SLERGUTINE COMPUTES ANGLE DEPENDENT OFFICAL FATHS
00765
         5254
                c
00765
         526≠
                      EMHOLE=0.
00770
         527
                      TWHO FEG.
00771
         5264
 00772
         529¢
                      DO 10 1=2,LIMIT
 00775
                      OTCENTal)=OTCENTal-1)+aFRESSal-1)+FRESSal))+aOZONEal)+OZONEal-1))+
         530≄
                      * 237.968
 00775
         531#
                      WATERal)=WATERal-1)+aHLMal)+SFHEREa$15,1)+AFRESSal-1)-FRESSal)))/
 00776
         532¢
 00776
         533#
                      PRESUR=#PRESS#1)+FRESS#1-1))/2.
 00777
         534*
 01000
         535#
                      TEMPORE ATEMPERAL) + TEMPERAL-1))/2.
                       ATCENTal) =aPRESSal) -PRESSal)) +.260
 01001
         536¢
                       EWHOLE=EWHOLE+@WATER@I)-WATER@I-1)) #PRESUR
 01002
         537*
                       THAT FETA IN FAMILITY AND THATERA (-11) ATTEMPTS
 91993
         53C#
                       EPRESSAI) = EWHOLF AWATERAIL
 01004
         539#
                       ETENTSal)=TWHOLE/WATERal)
 01005
         540*
 01006
         541¢
                       IFal.GT.1)
                      ##EIGHTal)=HEIGHTal-1)+29.3+TEMPOR+ALOGaFRESSal-1)/FRESSal))
 01006
         542*
                      ####1.+.50061#HUM#I))≠3.2858
 01006
         543¢
                       CONTINUE
 01010
         544*
                10
                       RETURN
 01012
         545*
                       SUBROUTINE STEPER
         546≄
 01013
 01013
         547#
                c
```

-05

```
THIS SUDPOUTINE EXPANDS OR CONTRACTS THE DATA TO THE NEEDED STEP SIZE
01013
        5484
               ¢
01013
        5494
               c
01016
        5594
                     J=1
                     LCCINT-HINGFRESSAL)/STEPSZ,SIZFTH)
01017
        551 *
61617
        552÷
                     TEST FOR END OF AVAILABLE DATA
01017
        5530
01917
        5544
                     IFMJ.GT.LCDINT) RETURN
01020
        555¢
01020
        556#
               c
                     SET AVAILABLE DATA
01025
        5574
               c
01620
        550¢
               ¢
                     FRESSP=FRESS#J)
01022
        559a
                     FRESUR=FRESSaJ+1)
61623
        5614
01023
        561‡
                      SET WANTED DATA
               C
01023
        562*
61923
        563#
               C
                      TEMPRE=TEMPERAJ)
01024
        564#
                      TEMPOR=TEMPER4J+1)
01025
        5654
                      OZONEP=CZONE4J)
01026
        5664
        5G7¢
                      OZONES=0ZONE#J+1)
01927
                      HUMIDF=HUMAJ)
        5<del>68</del>¢
01630
                      HUMID=HUMzJ+1)
01031
        569A
                      PREWAN=PRESSALL)-STEPSZ#J
01032
        57!)¢
        571#
01032
                      IS WANTED DATA WITHIN AVAILABLE DATA WINDOW
01032
        572≠
01032
        573≄
                c
                      IFAPREWAN.LT.PRESSF.AND.FROWAN.GE.FRESUR) GO TO 10
01033
        5744
                      GO TO 40
         5754
01035
01936
         576≄
                10
                      CONTINUE
01036
                      HOW MANY LEVELS OF WANTED DATA ARE WITHIN WINDOW
         578¢
                ¢
01036
01036
         579
                C
                      LCCS1Z=aPRESSF-PRESUR)/STEPSZ
 01037
         580≄
01937
         581*
                      MAKE SPACE IN AVAILABLE DATA FOR WANTED DATA
 01037
         5824
                c
 01937
         583*
                C
                      DO 20 KELEVELS, J,-1
 01040
         584*
                      FRESSaK+LODS1Z)=FRESSaK)
 01043
         585
                      TEMPERAK+LOCS1Z)=TEMPERAK)
 01044
         586¢
                      OZONEWK+LCCSIZ)=OZONEWK)
         567*
 01045
                      HUHWK+LOCS12)=HUHWK)
         588#
 01046
                      LEVELS=LEVELS+LOCSIZ
 01050
         589≑
 01050
         590+
                c
                      LOAD DATA OVER WANTED INTERVAL
         591‡
                C
 01050
 01050
         592*
                c
                       DO 30 K=1,LOCSIZ
 01051
         593≠
         594¢
                       J=J+1
 01054
                       TEMPERALI) ATERPAPAESSP, FRESUR, TEMPRE, TEMPOR, PREMAND
 01055
         595÷
                       CECKELS) - TEST - TRESON FREDER, CECKET, CECKETO, FRED MAD
 ودنين
         سور
                       HUR MUI) = TERF MFRESCP, PRESUR, HUMIDF, HUMID, PREVAND
 01037
         50†÷
                       FRESSau) = FREWAN
 01069
         5984
                       PREWAN-FREWAN-STEPSZ
 01961
         599*
                       CEFAULau) = CEFAULau-1)
 01062
         6004
                       CONTINUE
                30
 01063
         691*
 01063
         602#
                ¢
                       RESET BOTTOM LEVEL OF AVAILABLE DATA
                Ç
 01063
         603*
 01063
         604#
                c
```

```
60 TO 5
01565
        6054
                     CONT INUE
        6.,64
               49
01066
01066
        6.174
               C
                     DESTROY FOR LEVEL OF AVAILABLE DATA
               c
01066
        6/384
01066
        6094
              C
                     DO 50 KEJ, LEVELS
01967
        610≉
01972
        611#
                     FRESSAK+1)=FRESSAK+2)
                     TEMPERAK+1) = TEMPERAK+2)
01073
        612*
                     OZCNE4K+1)=OZCNE4K+2)
01074
        613*
01975
                     HUM4K+1)=HUM4K+2)
        614¢
                     DEFAULaK+1)=CEFAULaK+2)
01076
        615#
                     CONTINUE
01077
        616#
01101
        617#
                     LEVELS=LEVELS-1
                     GO TO 5
01102
        618¢
01103
        6194
                     ENC
```

END OF COMPILATION'

NO DIAGNOSTICS.

PREP TPF\$. FURPUR 0258-08/20-18:51

FOR,S MAIN/SLANT, MAIN, MAIN/SLANT FOR 94L-08/20-18/50 40,0)

MAIN PROGRAM

STORAGE USED: CODE(1) 002555 DATA(0) 000750 BLANK COMMON(2) (NO000)

COMMON BLOCKS!

0003 21 001464 0004 22 015530 0005 23 000005

EXTERNAL REFERENCES «BLCCK, NAME)

DODG VAPRES 0007 TAPLOT 0010 IDFRMV 6011 TABTEM CO12 SETHIV 0013 GRICIV **DG14** FRINTY 0015 LINEY 0016 NXV 6017 MYV 0020 NNCCO\$ 0021 CHSIZV 0022 DD23 RITE2V 0024 RADMOD 0025 FLTND 0026 FLTERM 0027 NINTR\$ 0030 NT(DUS 0031 NICES 0032 NA/CUS 0033 NIO1\$ 0034 ALCG 0035 NSTOF\$ 0036 ASIN 0037 SIN 0049 SQRT 0041 NERR4\$ 0042 NERR3\$

STORAGE ASSIGNMENT MBLOCK, TYPE, RELATIVE LOCATION, NAME)

10046
11956
13F
16F
23F
27 F
31F
•

```
001330 400L
                                                                                 D02505 40L
                                                                                                   0001
OCCAR
       D00422 33F
                         0000
                               000430 35F
                                                  G051
                                                        000603 390L
                                                                          0001
                                                                          6061
                                                                                 D02312 5L
                                                                                                   0001
                                                                                                          091352 599L
0001
       000631 4276
                         0001
                                D00722 4546
                                                  0.551
                                                         000767 464G
                                                                                                          051367 6236
                                                                          0001
                                                                                 001361 600L
                                                                                                   0001
0003
       G01241 543G
                                001270 5616
                                                  600.1
                                                         001273 5660
                         0.301
                                                                                                          001566 610L
DOM
       001436 6526
                         6691
                                001467 6716
                                                  0001
                                                         601629 7256
                                                                          00004
                                                                                 GG1374 8GGL
                                                                                                   0001
0001
                         0003 R 000000 AbstR
                                                  0003 R 000625 ABSORC
                                                                          5003 R 551325 ABSTRO
                                                                                                   0000 R 000063 AMAX
       GG1507 815E
                         GOGS R GOGGGE ANGLE
                                                  00004 R 004704 ATCENT
                                                                          0000 R 000126 BEGIN
                                                                                                   0004 R 011610 CFRESS
00000 R 000062 AMIN
                                                                                                   0000 R 000077 DEWENT
0004 1 613560 DEFAUL
                                                                          0000 R 000104 DEWAYS
                         00034 R 907640 DELTRA
                                                  0000 R 000057 CEST
                                                                                                   G003 R 901019 EXFCMO
DUNG R DOGGTG DEWPT
                         0004 R 010624 EPRESS
                                                  0004 R 012574 ETEMPS
                                                                          0000 R 000074 EMHICE
                                                                          9000 R 900127 FINIS
                                                                                                   0005 R 000116 FUNCTI
0003 R 000144 EXECN
                         0003 R 000632 EXECNO
                                                  9003 R 901154 EXPOND
DANNO R CONNOIS HEADER
                         OVVI R OVICTO HEAD!
                                                  9000 R 500071 HEAD2
                                                                          0000 R 000072 HEADS
                                                                                                   0004 R 002734 HEIGHT
                                                                                                   0000 1 000066 I
CODD R 000132 HIGH
                         9004 R 003729 HUM
                                                  00000 R 500105 HUMIC
                                                                          0000 R 000122 HUNDE
9000 I 000107 IFUNCT
                         11 P21(205 1 0000)
                                                  00000 - 0000656 INUES
                                                                           0000 000652 INJ#$
                                                                                                   9000 900675 INJE$
                         CONTO CONTOGG INJUST
                                                  CXXXX I CXXXX23 INSTR
                                                                          0003 R 900319 INTER
                                                                                                   0000 R 000000 INTERV
00000 0000662 INJP&
                                                                          0000 I 000067 LABEL
                                                                                                   DOGG R DUDGOL LEADER
0000 1 000106 1
                         0000 I 000110 JEUNCT
                                                  0000 I 000145 K
                         00000 I 0000115 LIM
                                                  0005 1 000000 LIMIT
                                                                           DOWN I DW0142 LCCINT
                                                                                                   0000 I 000144 LCCSIZ
DOXES I CONTRACT LEVELS
                         34AN 150000 I 0000
                                                  9000 I 900114 NLAST
                                                                           5016 | 0000000 NXV
                                                                                                    D017 I 000000 NYV
DOXXI 1 DOXXXI4 MESSAG
                                                                                                    00000 R 000101 PART
                                                                           DOOD R DOOLS OZONES
GUNA R GUSSONO OTCENT
                         COXIA R G14544 CZCNE
                                                  9000 R 900120 OZONEA
                                                                                                   90000 R 900064 PHINE
GOOD R GOO133 PART1
                         0000 R 000134 FART2
                                                  ONNO R ONO135 PARTS
                                                                           OCCUDER OCCUPANTAL
                         0000 R 000117 PRESSP
                                                  COOKS R CONSIGN PRESUR
                                                                           0000 R 000143 PREWAN
                                                                                                    0003 R 000454 RESPON
0004 R DUXXXXX PRESS
                                                                           0001 R 002022 SPHERE
                                                                                                    9000 R 900130 SAHEAE
0005 L 000003 SHELL
                         D000 R 000140 SLCPEA
                                                  00000 R 0000141 SLCPEB
                                                                                                    CANNO R DOMOLAR TERM
DOCKS R DOCKS61 STEESZ
                         0004 R 001750 TEMPER
                                                  DOOG R DOOLIGE TEMPOR
                                                                           50000 R 500121 TEMPRE
                         CONCOR DONOL31 TEST
                                                  DOOS R DOODOOS THETA
                                                                           0000 R 900065 TRANCE
                                                                                                    DOMA R DOGGS4 TRANSM
0001 R 002121 TERP
                                                  DONG R CONNING VAFRES
                                                                           0004 R 000764 WATER
                                                                                                    00001 R 5000125 WEIGH
                         OXXXX R DXXXXXX VAFER
D000 R D00075 TWICLE
                                                                                                    0000 R 000111 Y
DOXIS R DOXIGA4 WEIGHT
                         0000 R 000073 WHOLE
                                                  0000 R 000112 X
                                                                           00000 R 000113 XP
```

```
00101
                      COMPTLERADATA=SHORT)
          1#
                      EXTERNAL VAFRES
CO1U3
          24
00105
          34
                      REAL INTERV
00106
          4*
                      REAL INTER
                      REAL LEADER
00107
          5*
00110
          64
                      LOGICAL SHELL
                      PARAMETER SIZTRA=100
00111
           74
00112
                      PARAMETER SIZETH=500
          84
                                   ABSORGSIZTRA), EXPONESIZTRA), INTERGSIZTRA),
00113
                      COMMON/Z1/
          94
00113
         104
                                   RESPONASIZTRA), AESCRCa10), EXHONCa10),
00113
         11¢
                                    NEIGHTASIZTRA), EXPONDASIZTRA), EXPONDASIZTRA),
                                    ABSORO#SIZTRA)
00113
         120
                                   PRESSASIZATH), WATERASIZATH), TEMPERASIZATH),
DD114
         13*
                      COHMON/Z2/
                                   HEIGHT@SIZETH), HUMESIZETH), ATCENT@SIZETH),
00114
          144
                                    OTCENTASIZETH), TRANSMASIZETH), DELTRAUSIZETH),
00114
          15*
                                    EPRESSASIZETH), CFRESSASIZETH), ETEMESASIZETH),
00114
         16#
00114
          17#
                                   DEFAULASIZPIH), OZONEASIZPIH)
                                              ANGLE,
                                                        THETA.
                                                                   SPELL.
                                                                             LEVELS
00115
                      COMMON/Z3/
                                   LIMIT,
          18#
                      DIMENSION LEADER43)
00116
         19#
00117
         20±
                      DIMENSION MESSAGAID)
                      DIMENSION HEADER43)
00120
          21#
                      DIMENSION NAME (2), INSTRA28)
00121
         22#
00122
         23*
                      DIMENSION DESTARS)
                      DATA SHELL/.TRUE./
00123
          24#
                      DATA STEPSZ/5.0/
00125
         25#
                      INTEGER DEFAUL
00127
          26¢
                      CATA AMIN/-2.0/
00130
          274
                      DATA AMAX/11.57
00132
          28#
                      DATA NAME/"R CLARK"/, DEST/"HTF T-020"/, FHONE/"2146"/
DO134
          29¢
```

```
DATA INSTRUCCHE HARD COPY - ONE MICROFILM - PLOT TO ECFILE - T-020
09149
         300
00140
         314
                    *"/
00142
         32#
                     DATA TRANCE/199./
                     DATACTEMPERCID, 1=1, SIZETH) /SIZETH#9000./
GO144
         33¢
                     CATAMOZCNEGI), 1=1, SIZFTH)/SIZFTH44.67E-8/
00146
         344
(X)146
         35*
                     COMPUTE RADIANS FROM ANGLES
00146
         36*
0/3146
         37¢
00150
         384
                     RAD4ANG) = ANG/57.29578
00150
         39*
               C
                      COMPUTE SPECIFIC HUMIDITY FROM PRESSURE AND VAPOR PRESSURE
00150
         45.10
00159
         41 ×
               c
                      RATMIXAV, P) = 622.4V/aF-a.3784V))
00151
         42#
00151
         430
                      COMPUTE THE INDEX OF REFRACTION OF WATER-VAPOR AT THE TEMPERATURE
00151
         444
               c
                      AND PRESSURE OF A GIVEN LEVEL
00151
         45¢
G()151
         46≑
                      REFRAXaL1)=1.+477.526E-6)+FRE$S4L1)/TEMFER4L1)
GO152
         47¢
                      CALL TAPLOTATION)
00153
         484
                      CALL IDERMYANAME, DEST, FHONE, INSTR)
00154
         494
00155
         5/3·4
               100
                      CONTINUE
00155
         51≄
                      INPUT CONTROL CARDS
00155
         52*
                c
00155
         53¢
               Ç
                      READIS, 11, END=500) LIMIT, LABEL, HEAD1, HEAD2, HEAD3
00156
          54#
QU156
                Ç
         55
                      SET FLAGS TO ADJUST PRECIPITATELE WATER COMPUTATIONS FOR
00156
          56*
                      REFRACTION AT HIGH ALTITUDES
00156
          57≉
Q1156
         50.4
                c
                      IFALACEL.EQ. "SHERE") SHELL=.TRUE.
00165
          59#
                      IFALABEL .EQ. "FLAT ") SHELL" .FALSE .
00167
          €.*
                c
00167
          61¢
                      ADJUST DISPLAY WINDOW ON THE SC-4020 PLOTS
00167
          62±
                C
00167
          63#
                c
                      IFWLABEL.EQ. "MAXCOR") AMAX=LIMIT
GO171
          644
                      IFELABEL.EQ. "MINCOR") AMINELIMIT
00173
          65×
00173
          66*
                      INPUT THE ANGLE OF CESERVATION
00173
          67#
00173
          664
                C
                      IF4LABEL.EG. ANGLE ") ANGLE=LIMIT/15.
 00175
          69#
00175
          7Ú¢
                       INPUT RESPONSE FUNCTIONS
 00175
          71*
                c
 00175
          72*
                c
                       IF aLABEL . EQ. "RESPON") GO TO 200
00177
          73#
                c
 00177
          74±
                       INFUT RADIOSONDE DATA
 00177
          75#
 00177
          76#
                       IFHLASSI .EQ. "WATER ") GO TO 300
 00201
          774
          78*
                Ç
 00201
                       INPUT TEMPERATURE RANGE OF 195 POINT TABLE
          79¢
 00201
 00201
          80¢
                c
                       IFWLABEL.EQ. "TEMPER") GO TO 450
 00203
          81‡
          82*
                c
 00203
                       EXECUTE WITH DATA FROM FREVIOUS SOUNDING
 00203
          834
                c
          84+
                 ¢
 D0203
                       IFELABEL .EQ. "EXECUT") GO TO 390
 00205
          85#
 00205
          86$
                C
```

```
0.0205
        67¢
              c
                     RECORD A PRESSURE INCREMENT TO ESTABLISH THE STEP SIZE FOR RADIOSONDE
00205
        88¢
              c
                     DATA FROM THE SURFACE TO ONE MILLIBAR
00205
         894
              ¢
00207
        9.14
                     IFALABEL .EQ. "STEP ") STEFSZ=LIMIT
0/12/17
         91÷
              Ç
00207
         92‡
              ¢
                     INPUT MESSAGE LINES DESCRIBING OUTPUT
00297
        934
              C
00211
        94≠
                     IF«LACEL.EQ. "MESSAG") GO TO 600
00211
         95¢
00211
         964
              C
                     OVER-WRITE MISSING RADIOSCHOE DATA TO SATELLITE ALTITUDE WITH DEFAULT
06211
         974
              c
                     CATA
00211
         98≠
              c
D0213
                     GUS OF CO ("LUARED", SELECTED SUB-
        99‡
00213
       195≥
              C
00213
       1914
              c
                     INPUT SPECIAL TRACE GAS TRANSMISSION FUNCTIONS
00213
       1524
              c
DG215
                     IF-LAGEL.EQ. "TRACE") GO TO 1100
       163±
00217
        1(i4#
                     60 TO 199
00220
                     CONTINUE
       1554
             300
00220
       1964
              c
D0220
       157#
              c
                     RECORD NUMBER OF LEVELS FOR INPUT RADIOGONDE
00220
       1984
              c
00221
       1994
                     LEVELS=LIMIT
00221
       1104
              C
00221
       111*
                     SET CESERVATION ANGLE
CC221
        112#
              c
00222
       1134
                     THETA=RADWANCE FT
00222
       114☆
00222
       115#
              C
                     INITIALIZE FRECIPITABLE WATER COMPUTATION
0.1222
       116#
              c
00223
       117#
                     WHOLE:D.
00223
        118#
00223
                     INITIALIZE EFFECTIVE PRESSURE COMPUTATION
       119≎
              c
00223
       1204
              C
0.1224
        121#
                     EWHOLE#9
00224
       122‡
                     INITIALIZE EFFECTIVE TEMPERATURE COMPUTATION
00224
       123#
              c
00224
        1244
              c
00225
                     TWHOLE=9.
       1254
00225
              c
        126#
                     INPUT SURFACE RADIOSONDE DATA
00225
        127¢
              c
00225
        128#
00226
       129#
                     READAS, 12) PRESSA1), DENPT, TEMPERA1), HEIGHTA1), OZONEA1)
00235
                     DEFAULGED = 9
       1304
00236
       131#
                     IFWHEAD2.NE. "KELVIN") DEWFT=DEVPT+273.16
00249
       132*
                     IFAHEADZ.NE. "KELVIN") TEMFERA1) = TEMFERA1) +273.16
                     INVERSINE TOUTHE TO FEDRE, 1, DEFAULTED 17:
00242
       133#
                     IFAHEADS.NE. "OZONE") OZONEHI) - A EZE-9
00244
       134*
00246
                     DEWENT=DEWET
       135≑
00246
       136≑
00246
        137#
              c
                     COMPUTE SURFACE VAPOR PRESSURE
00246
        138#
              ¢
                     VAPER=VAFRES@DEWFT)
00247
       139*
00247
        140#
              c
00247
                     USE DEW-FOINT GREATER THAN 77 DEGREES TO ASSUME 10 PERCENT
       141*
                     RELATIVE HUMIDITY
00247
       142±
              c
00247
        143#
              c
```

```
1FaceLet.CE.350.) VASER:VASRES/JEMSER/(1))4.1
00250
       144#
                     IF@DEWFT.GE.350.) FLDm3,1,DEFAULall)=1
003252
       145*
00252
       146¢
                     COMPUTE THE SURFACE SPECIFIC HUMIDITY
00252
        147#
00252
        1480
                     PART=RATHIX#VAPER.PRESS41))
00254
        1492
CR3254
        1504
                     STORE THE SPECIFIC HUMIDITY CONFUTED AT THE SURFACE
00254
        151# C
00254
        152≎ €
00255
        153≑
                     HUM41)=FART
             c
(4)255
        1540
                     THE ATMOS-CENTIMETERS OF CARDON DIOXIDE AND CROSS AT THE SURFACE
00255
        1554
              c
00/255
        156#
                     ATCENTal)=9.
D0256
        157¢
00257
        1582
                     OTCENTai) =9.
00257
        1590
                     THE EFFECTIVE PRESSURE AT THE SURFACE IS EQUAL TO THE RADIOSONDE
CG257
        1600 C
                     SURFACE PRESSURE
00257
        161¢ €
00257
        162#
                     EFRESSal)=FRESSal)
00260
        163*
                     CPRESS41)=PRESS41)
00261
        164#
00261
        165≑
                     LABEL THIS PAGE OF ABSORBING GAS CONCENTRATIONS.
00261
        166#
              c
00261
        167#
              Ç
                      WRITE46,27) @MESSAG@I),1=1,15)
00262
        1684
                     DEWPT=DEWFT-273.16
002270
        169≎
                      TEMPOR=TEMPERall-273.16
00271
        170+
        171#
                      WRITE46,14) FRESS(1), CEWFT, TEMPOR
00272
                     00 10 I=2,L!MIT
00277
        1724
               c
00277
        173#
 00277
         174¢
               ¢
                      EXTRACT A LEVEL*S DATA
00277
        175#
               C
                      READAS, 12) PRESSAI), DEWPT, TEMPERAI), HEIGHTAI), OZONEAI)
00302
        176
 00311
         177#
                      DEFAULa1)=9
00311
        1784
               C
                      CONVERT HEIGHT TO FEET IF NEEDED
 00311
        179≄
               C
 00311
         160*
                      [FaHEAD1.EQ. "METERS") HEIGHTAI)=HEIGHTAI)+3.2808
 00312
         181±
 00312
         182%
               C
                      COMPUTE AVERAGE PRESSURE OF A LAYER
 00312
         183*
 00312
         184¢
               c
                      PRESUR=aPRESSaI)+PRESSaI-1))/2.
 00314
         185≄
 00314
         186#
                c
                      CONVERT FROM CENTIGRADE TO KELVIN IF NEEDED
 D0314
         187¢
               ¢
 00314
         188#
                Ç
                      IFWHEACS.NE. "KELVIN") CEWFT=CEWFT+273.16
         169+
 00315
                      IFMFEACE.NE. "KELVIN") TEMFERAI) = TEMFERAI) +273.16
 00317
         1954
 00317
         1910
                c
                       IMPOSE A CONSTANT OZONE PROFILE IF NEEDED
 66317
         1924
                ¢
 00317
         1934
                c
                       IF@HEAD3.NC. "OZONE") OZONE#1)=4,67E-8
 00321
         1944
                       IFAHEAD3.ME. "OZONE ") FLDa2,1,DEFAULa1))=1
 00323
         195¢
               c
 00323
         196÷
                      COMPUTE THE AVERAGE LAYER DEW POINT
 00323
         197¢
         198#
                ¢
 00323
                      DEWAYGE & DEWFNT+DEWFT) /2.
 00325
         199#
```

200#

00325

c

```
W1325
        2014
                     COMPUTE THE VAPOR PRESSURE
D0325
        2:12+
               c
D0326
        2034
                     VAFER=VAFRESILDEWAVG)
00356
        2044
               C
00326
        205¢
                     USE DEW-FOLKT GREATER THAN 77 DEGREES TO ASSUME 10 PERCENT
               c
(K)326
        2064
               ¢
                     RELATIVE HUMIDITY
00326
        207*
               C
G0327
        2084
                     IF@DEWFT.GE.350.) VAPER=VAPRES@TEMFER@I))#.1
00331
                     IF@DEWPT.GE.350.) FLD@3,1,CEFAUL@1))=1
        2094
G0331
        2104
GO331
        2114
              C
                     CONFUTE THE MIXING RATIO OF THIS LAYER
60331
        212*
              C
00333
        213¢
                     HUMID=622. #VAFER/GFRESUR-VAFER)
00333
        214#
              ¢
00333
        215*
              C
                     COMPUTE THE AVERAGE TEMPERATURE OF THIS LAYER
D3333
        216*
00334
        217#
                     TEMPORTATEMPERAL) +TEMPERAL-1))/2.
00334
        218#
              c
D0334
        219#
                     CONFUTE THE HEIGHT OF THE TOP OF THIS LAYER IF NEEDED
D0334
        2204
              c
00335
        221#
                     IF at EIGHT att .LE.D.)
00335
                    ##EIGHTal)=HEIGHTal-1)+29.3¢TEMFOR#ALOCAFRESSal-1)/FRESSal))
        2224
D0335
        223#
                    +>41.+.00061#HUMID) +3.2808
00335
        224#
              C
00335
        225±
                     STORE THE SPECIFIC HUNIDITY AT EACH LAYER TOP
00335
        226#
              ¢
00337
        227#
                     HUMAI) = RATMIXQVAFER, FRESLR)
DO337
        228#
03337
        2294
              C
                     COMPUTE THE FRECIPITABLE WATER AT THIS LEVEL
00337
        2304
              C
00349
        231≠
                    WATERal)=WATERal-1)+aHUHAl)+SFHEREa$15,[)+aFRESSAl-1)+FRESSAl)))/
00349
        232*
                    * 985
00340
        233¢
90349
        234*
              C
                    CONFUTE THE ATMOS-CENTIMETERS OF CARBON-DICKIDE AND OZONE TO THIS
0.1340
        235* C
                    LAYER
00340
        236#
              C
00341
        237#
                    ATCENTal)=aFRESSal)-FRESSal)) #.260
00342
        238*
                    OTCENTal) =OTCENTal-1) +aFRESSal+1) -PRESSal)) +aDZCNEal) +OZCNEal-1)) +
00342
        239¢
                    237.968
00342
        240+
00342
                    COMPUTE THE EFFECTIVE TEMPERATURES AND PRESSURES USED TO RELATE
        241*
              c
00342
                    HOHOGENEOUS FATH TRANSMISSION FUNCTIONS TO INHOMOGENEOUS SLANT
        2424
              Ç
00342
        243#
                    PATHS THROUGH THE ATMOSPHERE
00342
        244#
00343
        245#
                    ENHOLE = ENHOLE + aWATERa (1) - WATERa (1-1)) +PRESUR
00344
        246*
                     TWHOLE=TWHOLE+aWATERaI)-WATERaI-1)) #TEMFCR
00345
                    CFRESSal)=aFRESSal)+FRESSal))/2.
       247#
143346
       248*
                    EFRESSAI) = EMPTLE / WATER # 1)
       2.0-
1011/1
                    FTENERALLY-TUMN FAMILEALLY
00347
       2504
00347
       251 ¢ C
                    COMPUTE CENTIGRADE VALUES FOR DISPLAY
09347
       252# C
00350
       253≑
                    CEWAYG=DEWFT-273.16
00351
                    TEMPOR=TEMPERAL)-273.16
       254≠
00351
       255* C
00351
       256# C
                    FRINT INTERMEDIATE RESULTS OF THIS PROCESS
00351
       257#
              C
```

```
WRITER6,13) FRESSULD DEWAYS, TEMPOR, HEIGHTULD, WATERULD, ATCENTULD,
00352
        2584

    OTCENTal) (EFRESSal) (CFRESSal) (ETEMPSal)

00352
        2594
00366
        2654
                     CEMENT = DEWET
                     CONTINUE
00367
        261+
                                                                                                 NEW
                     60 TO 199
69371
        262¢
00372
        2634
               11
                     FCRHATH[10,46,6X,3AG)
                     FORMAT41X,F7.1,2X,F6.1,4X,F7.1,3X,F10.1,E10.5)
00373
        264¢
                     FCRMATalx, F7.1, 2x, F6.1, 4x, F7.1, 3x, F15.1, 1x, F7.4, 1x, F6.1, F6.3, 2x,
DU374
        265#
               13
00374
        2664
                     #6x,F6.1,6x,F5.1)
00374
        267#
                     FORMATA" PRESSURE DEW POINT TEMPERATURE HEIGHT FRECIP ATMOS-CE
00375
        2684
                     WAT EFFECTIVE CONSTANT EFFECTIVE", /, " ", F7.1, 2X, F6.1, 4X, F7.1
00375
        269¢
                                      WATER COX2 OZONE PRESSURE CONCENTRATION TEMP
00375
        2704
                              FEET
QU375
                     #ERATURE")
        271*
                     FORMATGE7.1.F7.4)
00376
        2724
00377
        273*
                     FORMATa1x, F7.1, F7.4)
00400
        274#
                     FORMATATH ANGLE ,F4.1,20H DEGREES FROM NADIR ,7,20H SURFACE TEMPER
                     #ATURE,F7.1)
00460
        275*
                     FORMATAIX, 36HTEMPERATURE RANGE OF 1900 POINT TABLE)
60491
        2764
               18
                     FORMATA 42H1WAVENUMBER MIDROINTS AND FERCENT RESPONSE)
00402
        2774
               19
                      FORMATA 37H1TEMPERATURE RANGE OF 1973 POINT TABLE)
00493
        278¢
               21
                     FORMATA" PRESSURE PRECIP HEIGHT SPECIFIC TEMP
                                                                                 CORRECTI
001404
        2794
                     #CN";/; "
# MB
                                       WATER
                                                          HUMICITY
                                                                     SOUNDING"./.
00494
        280
                                                           CH/KCH
                                                                     ĸ
00404
        281¢
                     FORMATKIH ,3A6)
00405
        2824
               23
                      FORMATOF4.1,14H DEG. TO NADIR)
00466
        283≠
               24
00497
                      FORMATOFS.1,13H SURFACE TEMP)
        284#
               25
                      FORMATALDAG)
00410
        2854
               26
                      FCRMATa1H1,1DA6./)
00411
        286*
               27
                      FORMAT#4E10.5)
00412
        287#
                      FQRMAT41X,F6.1,"-",F6.1,443X,F7.4))
00413
        2884
                29
                                                         A+aATMOS-CENT++E)+aEF++C)*,/,
                      FORMATRIHD, 3A6, /, * WAVENAMEER
00414
        2894
                31
                                                    В
                                                              c
                                         A
00414
        290+
                     ** INTERVAL
                      FORMAT@1X,F7.1,2X,E10.5,2X,F6.1,2X,E10.5)
00415
        291¢
                33
                      FORMATA*1DEFAULTED STRATOSPHERE PROFILES*,/,
                                                                                                  NEW
                35
00416
        292#
                             " PRESSURE OZONE
                                                  TEMP
                                                              SPECIFIC"./,
                                                                                                  NEW
Œ1416
        293#
                                                   SOUNDING HUMICITY*,/,
                                                                                                  NEW
00416
        294*
                             * HB
                                                              GM/KGM*)
                                                                                                  NF.
00416
        295*
                      CONTINUE
00417
        2964
                390
                      TEASTERSZ.GT.O.) CALL STEPER
00420
                      IFASTEPSZ.GT.O.) CALL DISPLY
00422
        298*
                c
00422
        299±
                      ESTABLISH A TEMPERATURE BLACKBODY INTENSITY SCALE
         300*
                ¢
00422
         301≄
                c
00422
                      CALL TABTEMATEMPERALL, TRANCE)
D0424
         3G2#
00424
         303≠
                C
                      PRODUCE A DISPLAY TO SHOW TEMPERATURE CORRECTION AS A FUNCTION OF
00424
         304#
                c
                      LINE OF SIGHT ANKLE, METCHT IN METERS, AND PRECIPITABLE VATER.
         3554
 COLUMN 2
                •
 00424
         3064
                C
                      WRITER6,27) aMESSAGaI), I=1,10)
 00425
                      IFaSHELL) LEACERAS) = "SPHERE"
         308*
 00433
                      WRITEGS, 23) LEADERG1), LEACERG2), LEADERG3)
 00435
         309*
                      WRITEGS, 17) ANGLE, TEMPERG1)
 00442
         310+
                      WRITE46,22)
 00446
         3114
                      CALL SETMIVA150,150,150,55)
 00450
         312*
                      CALL GRIDIY41,AMIN,AMAX,9.,60000.,1.,70000.,0,0,1,1,3,3)
 00451
         313¢
                      CALL PRINTVale, LEACER, 703,48)
 00452 314*
```

FOR 5 RACHIC/SLANT1 , RACHIC , RACHIC/SLANT1 FOR 9%L-08/20-18/50 $\langle \alpha 0 \rangle (0)$

SUBROUTINE RADING ENTRY POINT 1000210

STORAGE USED! CODE41) 500/222 DATA-0) 000/006 BLANC COMMONA2) 900/000

COMMON BLOCKS!

 CO03
 Z1
 CO1464

 COX4
 Z2
 CO2570

 COX5
 Z3
 COXXXIS

EXTERNAL REFERENCES ABLOCK, NAME)

0006 TRANS 0007 TEMTAB 0016 COS 0011 EXP 0012 NERR3\$

STORAGE ASSIGNMENT ABLOOK, TYPE, RELATIVE LOCATION, NAME)

0001	000005 1216	0001 000020 127G	0001 000126 1436	0001 000157 36L	9003 - 500000 ABSOR
0003	DOMEST ABSORD	DOM3 DO1320 ABSORD	DIXIS CRXXXII ANGLE	0004 R 000764 ATCENT	5000 R 000013 ATMOS
Uslia	GO1750 CFRESS	ONTA DOZZED CEFACE	ULXUA R CXII 440 CELTRA	0000 R 000014 DETECT	9000 R 900015 CRITEM
D 0064	DO1604 EFRESS	CXXI4 CXT2114 ETEMPS	0003 - 001010 EXPOND	0003 900144 EXPON	9003 910632 EXPONC
0003	DG1154 EXPOND	0004 000454 HEIGHT	D0034 - D00620 HUM	5000 I 500004 I	0000 000024 INJP\$
	COXXXXI INTEN	DO03 R D00310 INTER	DOOD R DOORSON INTERV	9000 I 000002 J	0005 000004 LEVELS
	DOXXXXX LIMIT	5904 R 901130 OTCENT	DOM DOZAZA OZONE	0004 000000 FRESS	0003 R 000454 RESPON
	D000011 SFC08	DOOS L DOOWS SHELL	DOOM R DOOSED TEMPER	0000 R 000012 TEMPOR	ATHT SOCOOD R 2000
	DUDUCO TRANS	OOG4 R CO1274 TRANSM	DOO'A R DOO'144 WATER	DOWN R DOWNS WATERO	DODG R GOODGY WATERD
OLUL R	DOCCOS WATERS	COCOVER CONNING A CONDO	9003 - 900644 WEIGHT	0000 R 000010 WHOLE	

```
00101
                     SUBROUTINE RADMODZDLTEMF)
         1+
00101
               c
                     THIS SUBROUTINE INTEGRATES THE RADIATIVE TRANSFER FUNCTION USING
00101
          3≑
              Ç
00101
                     THE TRAPEZOID RULE.
          4#
              c
00101
DG103
          6.9
                    LOGICAL SHELL
GG104
                    EXTERNAL TRANS
         7≠
D0105
          84
                     REAL INTER
96106
          9*
                     REAL INTERV, INTEN
00167
         10*
                     PARAMETER SIZTRA=150
00110
         11÷
                     PARAMETER SIZETH=100
                    COMMON/ZI/ ABSORGSIZTRA), EXFONGSIZTRA), INTERGSIZTRA),
00111
         12#
00111
                                 RESPONDE SIZTRA) (ABSORCALD) ( EXPONCALD) (
         13¢
00111
         14#
                                 WEIGHT@51ZTRA), EXPONDES1ZTRA), EXPONDES1ZTRA),
00111
         15¢
                                 ABSORO#STZTRA)
                    COMMON/ZZ/ PRESSASIZPTH), WATERASIZPTH), TEMPERASIZPTH),
00112
        16#
```

```
HEIGHTASIZETH) , HUMASIZETH) , ATCENTASIZETH) ,
09112
         174
                                  OTCENTASIZPTH), TRANSMISIZPTH), DELTRAASIZPTH),
00112
         184
                                  EFRESSASTZETH), CERESSASTZETH), ETENESASTZETH),
00112
         19#
                                  DEFAULASIZETH), OZCNEASIZETH)
00112
         204
                     COMMON/23/ LIMIT, ANGLE, THETA,
                                                                SHELL
00113
         216
CO113
         22#
                     ARITHMETIC FUNCTIONS
00113
         234
               €
00113
         24#
              C
                     BBCCYuV,T)=a8.9349E-13#V##3)/aEXFaa1.43854V)/T)-1.5)
00114
05115
         26¢
                     TEMP4D, V,W) =41.4385$V) /ALCGaddW08.9346E-134V$$3) /C)+1.)
60115
         274
                     INTEN IS THE SUMMATION OF PRODUCTS GRADIANT INTENSITY TIMES
00115
         26+
00115
               ¢
                     WAVE NUICER INTERVAL)
         29
60115
         30-
              c
00116
                     INTEN=0.
         314
00116
         324
                     INTERV IS THE WAVE NUMBER INTERVAL
00116
         33¢
              c
00116
         34#
               C
         35≄
                      INTERV=25.
00117
                     DO 30 J=1,85
00120
         364
00120
         37*
               C
         3-3+
                      SKIP INTERVALS HAVING A ZERO RESPONSE FUNCTION.
03120
               C
00120
         394
               C
CG123
          4£/#
                      IFARESFONAU) LE.G.) GO TO 39
         41#
               ¢
00123
                      WAVENO IS THE MEAN WAVENUMBER OF THE INTERVAL BEING EVALUATED
00123
          424
               c
CC123
          43≄
                      WAVEND=INTERAU)
00125
          44
                      DO 10 I=1.LIMIT
00126
          45#
 00126
          464
                c
                      COMPUTE THE OFFICAL PATHS OF ABSORBING GASES
          47¢
                c
00126
                ¢
 00126
          di to
                      WATERS-WATERAL IMIT) -WATERAI))/COSATHETA)
 00131
          49*
          5C+
                C
 GO131
                      FOR SATELLITE ALTITUDE CONFUTATIONS THE OFFICAL FATH OF WATER
 GG131
          51 zz
                C
                      VAPOR MUST INCLUDE THE INDEX OF REFRACTION CHANGES
 00131
          524
                c
 00131
          53*
                      IFASHELL) WATERS = WATERALIMIT) -WATERAI)
 00132
          544
                      WATERC=@ATCENTallMIT) -ATCENTall) / COSathETA)
 00134
          55¢.
                      WATERCHOTCENTAL INIT) -OTCENTAI))/COSATHETA)
 00135
          564
               c
 00135
          57☆
                      COMPUTE THE TRANSMISSIVITY FOR EACH LEVEL
 00135
          58¢
                ¢
 D0135
          59#
                C
                      TRANSMAI) = TRANSAWAVENO, WATERS, WATERC, WATERO, I)
 D0136
          60*
                10
 00136
          61 
                c
          62*
                c
                      INITIALIZE THE UPWELLING RADIATION
 00136
 00136
          63*
                c
 00149
                      MHOLE-D.
                c
 00140
          65*
                      FOR THIS INTERVAL CONFUTE THE EXTINCTION OF A SURFACE IMAGE.
 00140
          66#
                c
                c
 00140
          67#
                      SECBB=TRANSMa1) &CBCCYGWAVENO, TEMFERa1))
 G0141
          68#
 DO141
           69#
                •
                      USING WATER VAPOR, CARBON DIOXIDE AND OZONE AS THE INDEPENDENT
 00141
           704
                       VARIABLES INTEGRATE THE CONTRIBUTIONS OF EACH ATMOSPHERIC LAYER
 00141
           71¢
                C
                       TO THE IMAGE IN THIS INTERVAL
 00141
           72*
                c
 00141
           73+
```

```
DD 29 1:2,L180T
00142
00142
         75¢
                     FIND THE CHANGE IN TRANSMISSION BETWEEN LAYERS
00142
         76¢
CA3142
                     CELTRAGI) = TRANSHGI) + TRANSHGI-1)
         784
00145
00145
         79.4
               c
                     FIND THE AVERAGE TEMPERATURE OF A LAYER
G3145
         804
DG145
         614
               c
                     TEMPOR=ateMPERal)+TEMPERal+1))/2.
00146
         62¢
(23) 46
         83*
                      COMPUTE THE EMISSION FROM THAT LAYER
00146
         844
               C
00146
         654
               c
                     ATMOS=EDODY@WAVENO, TEMPOR)
00147
         £64
00147
         87±
               Ç
                     WHOLE IS THE SUM OF PRODUCTS MATHOSPHERIC INTENSITY TIMES CHANGE
00147
         884
               C
                      IN TRANSMISSION)
00147
         894
00147
         904
                      WHOLE=WHOLE+WATMOSCOELTRAGI))
00150
         91#
00151
          92÷
                20
                      CONTINUE
         934
                C
Q0151
                      INTEGRATE UPWELLING RADIATION FOR THIS INSTRUMENT
00151
          944
                ¢
QD151
          95#
                      INTENHINTENHANICLE+SECED) (RESECNAL)
GO153
          96*
 Q1154
          97#
                30
                      CONTINUE
                      DETECT=INTEN#INTERV
 00156
          984
                c
 00156
          994
                      EXTRACT A MATCHING DETECTOR TEMPERATURE FROM THE CALIBRATION TABLE
 CO156
         1000
                c
 00156
         191*
                      CALL TEMTAD ADETECT, CRIENT)
 00157
         102#
                      DUTEMPETEM ERG1) - DRITEMP
 00160
         153≄
         104#
 00160
                      DISPLAY TEMPERATURE CORRECTION AS A FUNCTION OF PRECIPITABLE WATER
 60169
         105±
                c
                      HEIGHT OF THE COSERVATION PLATFORM.
 00160
         106≑
                C
         197¢
 00160
                      RETURN
         198*
 DO161
 90162
         109*
                      END
```

END OF COMPILATION

NO DIAGNOSTICS.

FOR 941-08/20-18/50 40,0)

SUBROUTINE RADHOO ENTRY POINT 000276

STORAGE USED: CODE41) 909396 DATA451 909965 BLANK COMMON421 900099

COMMON BLOCKS!

0003 21 001464 0004 22 015530 0005 23 000005

EXTERNAL REFERENCES &BLOCK, NAME)

0006 TRANS
0007 TEMTAB
0010 LINEV
0011 NXV
0012 NYV
0013 CC6
0014 EXP
0015 NACUS
0016 NICE\$
0017 NERR3\$

STORAGE ASSIGNMENT GELOCK, TYPE, RELATIVE LOCATION, NAME)

_	con correct the	9901 9XXXI34 1336	00001 D000142 1476	9001 900173 30L
0000 000023 11F	00001 0000021 1256	== *		
0003 DOXXXXX ABSOR	0003 000620 AB\$0RC	0003 001320 ABSORD	0005 000001 ANGLE	SXXX4 R SXX47S4 ATCENT
0000 R 000015 ATHOS	0004 011610 CFRESS	0004 013500 DEFAUL	0004 R 907640 DELTRA	0000 R 000016 DETECT
DONO R OUXXXXX DLTENF	DOOD R DOODLY DRIEMP	0004 - 010624 EFRESS	0004 G12574 ETEMPS	0003 001010 EXPCMD
0603 000144 EXPON	0003 000632 EXPONC	0003 001154 EXECNO	DUNA R IXI2734 HEIGHT	9064 R 903725 HUN
COOCULT DOODOOG I	0000 000042 INJP\$	OCCCO R GOVCOOL INTEN	9003 R 900310 INTER	9000 R 900000 INTERV
0000 1 000004 J	00015 00000014 LEVELS	0005 I GOXXXXX LIMIT	9011 I 000000 NXV	0012 900000 NYV
DOG4 R DG5675 OTCENT	0004 014544 OZCNE	0004 R 000000 PRESS	0003 R 000454 RESPON	0000 R 000013 SECEB
DOUS L DODONOS SHELL	0004 R 001750 TEMPER	00000 R 5000014 TEMPOR	DOOS R DOODOZ THETA	0006 R 000000 TRANS
DODA R DG6G54 TRANSM	D004 R D00764 WATER	DODG R UDDG10 WATERC	DODO R SCHOOL WATERO	0000 R 000007 WATERS
DOGG R DUGGGS WAVEND	0003 000644 WEIGHT	COOR R SCOOTS WHOLE	0000 R 000021 X	9000 R 900002 XP
0000 R G00022 Y	0000 R 000003 YP			

SUBSCULTINE RADMOD 00101 c 60101 24 THIS SUGROUTINE INTEGRATES THE RADIATIVE TRANSFER FUNCTION USING 00101 3¢ c THE TRAFEZOID RULE. 00101 4¢ c c 00101 5* LOGICAL SHELL 00103 6# EXTERNAL TRANS 7≄ 00104 REAL INTER 00105 8# REAL INTERVI INTEN 00106

```
00107
         10.0
                     PARAMETER SIZETH=500)
60110
         11#
                     PARAMETER SIZIRATION
00111
                     COMMONIZIZ ABSORMSIZTRA), EXPONMSIZTRA), INTERMSIZTRA),
0.0111
                                   RESPONDE STATE AND ABSORDED ( EXECUTED ) .
         134
00111
         140
                                  WEIGHTHSIZTRA), EXPONOUSIZTRA), EXPONDUSIZTRA),
0.0111
                                   ABSCROUSTZTRA)
         150
00112
                     CCMMIN/22/
                                  PRESSASTZATH), WATERASTZATH), TEMPERASTZATH).
         164
                                  HEIGHTASIZETH), HUMISIZETH), ATCENTASIZETH),
0.0112
         174
0.0112
                                   OTCENTAS12FTH), TRANSMIS12FTH), DELTRAAS12FTH),
         184
                                   EPRESSASIZETH), CERESSASIZETH), ETENESASIZETH),
00112
         19#
                                   CEFAULASIZETH) (OZCIEASIZETH)
03112
         2.14
00113
                     COMMON/23/ LIMIT, ANGLE,
                                                       THETA,
                                                                 5 ELL
                                                                         LEVELS
         214
0.0113
         224
00113
                     ARITHMETIC FUNCTIONS
         234
               C
00113
         24≎
00114
                     BBCDYqV,T)=q8.9349E-13*V$$3)/dEXFdq1.4385$V)/T)-1.5)
         25#
00115
                     TEMP4D, V, W) = 41 .4365+V) /ALCG44nW68.9346E-134V##3) /C)+1.)
         26¢
                      IFaLIMIT.EQ.2) XF=0.0
DJ116
         274
00120
                      IFELIMIT.EQ.2) YF=0.0
         28≄
00120
               c
         29≄
                      INTEN IS THE SUMMATION OF PRODUCTS MEADIANT INTENSITY TIMES
00120
         31.14
               c
00120
         31¢
                     WAVE NUMBER INTERVAL)
00120
         32*
               c
00122
                      INTENSO.
         33*
00122
         34*
               ¢
00122
         35*
                      INTERV IS THE WAVE NUMBER INTERVAL
               C
00122
         36∻
               C
00123
         37≠
                      INTERV=25.
DG124
                     DO 35 Ja1,85
         384
00124
         39⇒
                      SKIP INTERVALS HAVING A ZERO RESPONSE FUNCTION.
00124
         4:34
00124
         41¢
                      IFARESPONAU) .LE.G.) 60 TO 35
00127
         42¢
00127
         43☆
               c
                      WAVENO IS THE MEAN WAVENUMBER OF THE INTERVAL BEING EVALUATED
00127
         444
               c
00127
         45≉
               C
                      (LDRITHI=CHIVAW
00131
         46¢
00132
         47±
                      DO 19 I=1,LIMIT
00132
         48:
                      COMPUTE THE OFFICAL FATHS OF ABSORBING GASES
00132
         49×
               c
60132
         50 a
              c
00135
          51≠:
                      WATERS=QWATERQLIMIT)-WATERQI))/CO6qTHETA)
00135
         52#
                      FOR SATELLITE ALTITUDE CONSULTATIONS THE OFFICAL PATH OF WATER
00135
         53¢
               c
                      VAPOR MUST INCLUDE THE INDEX OF REFRACTION CHANGES
00135
          54*
               c
00135
         55#
                      IFASHELL) WATERS = WATERALIMIT) -WATERAI)
00136
         564
                      MATERICHMATCENTAL INIT) -ATCENTALL) / COSATHETA)
22142
         57#
                      WATEROFILOTCENTILLIMIT) -OTCENTILL) /COSATHETA)
00141
00141 .
         59≑
               C
                      COMPUTE THE TRANSMISSIVITY FOR EACH LEVEL
00141
          604
               c
00141
          61 *
                      TRANSMIT) = TRANSAWAVEND, WATERS, WATERC, WATERO, I)
00142
                10
          62*
00142
          63#
                c
00142
                      INITIALIZE THE UPWELLING RADIATION
          64#
                c
00142
          65*
                ς
DO144
          66#
                      WHOLE:0.
```

```
00144
         67¢
               ¢
                     FOR THIS INTERVAL COMPUTE THE EXTINCTION OF A SURFACE IMAGE.
C25144
         68≄
               c
GO144
         69⊅
               c
001145
         70.0
                     SECRESTRANSMILL RECOCYMUNICAD. TENFERGILL
(V)145
               c
         71 0
                     USING WATER MARCH, CARDON DIGNIDE AND OZONE AS THE INCEPENCENT
GC145
         774
               c
                     VARIABLES INTEGRATE THE CONTRIBUTIONS OF EACH ATMOSPHERIC LAYER
TØ145
         73¢
               c
                      TO THE IMAGE IN THIS INTERVAL
(0)145
         74#
               C
00145
         75+
E65146
         764
                     DO 25 1=2.LIMIT
GG146
         77¢
                     FIND THE CHANGE IN TRANSMISSION BETWEEN LAYERS
C25146
         76 Φ
               C
00146
         79≎
               C
                     DELTRACI)=TRANSHAI)-TRANSHAI-1)
00151
         60+
00151
               Ç
         81 #
                     FIND THE AVERAGE TEMPERATURE OF A LAYER
00151
         824
               c
00151
         834
00152
         84*
                      TEMPCR=aTEMPERaI)+TEMPERaI-1))/2.
               C
00152
         854
                      COMPUTE THE EMISSION FROM THAT LAYER
00152
         86#
               C
00152
          87¢
                ¢
                      ATMOS=BBCDYWWAVEND, TENFOR)
00153
          &A3
OU1 53
          894
               C
                      WHOLE IS THE SUM OF PRODUCTS WATHOUPHERIC INTENSITY TIMES OWNIGE
00153
          9.*
                      IN TRANSMISSION)
00153
         91+
               C
00153
          92*
               C
(70154
          93*
                      WHOLE=WHOLE+WATHOG&DELTRAW[])
00155
               23
                      CONTINUE
          94#
DO155
          95*
                c
                      INTEGRATE LEWELLING RADIATION FOR THIS INSTRUMENT
00155
          $6.0
                ¢
          97¢
00155
                      INTEN=INTEN+«WICLE+SECEE) #RESECTALL)
00157
          96*
                      FCRMATa1x,F7.1,2x,F7.4,1x,F8.1,E10.5,3x,F7.2,4x,F7.2)
00160
          99±
                11
 DC161
         1904
                      CONTINUE
                      DETECT=INTEN+INTERY
 C0163
         161¢
 00163
         102*
                      EXTRACT A MATCHING DETECTOR TEMPERATURE FROM THE CALIBRATION TABLE
 00163
         103≑
 00163
         104#
                      CALL TEMTABACETECT, DRTEMP)
 00164
         105¢
                      OLTEMP=TEMPERa1)-CRITEMP
 00165
         106#
         1074
 00165
                      DISPLAY TEMPERATURE CORRECTION AS A FUNCTION OF FRECIPITABLE WATER
 DO165
                C
         108*
                      HEIGHT OF THE COSERVATION FLATFORM.
 00165
         109*
               C
 00165
         110#
                c
                      WRITEAG, 11) FRESSALIMIT), WATERALIMIT), HEIGHTALIMIT), HUMALIMIT),
 00166
         111#
                      * TEMPERALIMIT), CLIENT
 D0166
         112*
                      X=DLTEMF
 00176
         113*
                       Y=HEIGHT@LIMIT)
 FIO1 77
         1144
                      CALL LINEVANXVXXF), NYVXYF), NXVXX), NYVXY))
 ตารเกา
         1154
 00201
         116*
                      XF=X
 00202
         117#
                      YP=Y
                      RETURN
 D0203
         118#
 00204
         119*
                      END
```

END OF COMPILATION' NO DIAGNOSTICS.

FOR 94L-08/20-18:50 40(0)

FUNCTION TRANS ENTRY POINT (XXXL66

STORAGE USED! CCCE41) 5000515 DATAGO; 5000103 BLANK CCMMON(2) 5000000

COMMON BLOCKS!

0003 21 001464 0004 22 002570

EXTERNAL REFERENCES WELCCK, NAME)

0005 NEXP68 0006 ALGG10 0007 EXP 0010 NERR38

STORAGE ASSIGNMENT MELOCK, TYPE, RELATIVE LOCATION, NAME)

0001 000447 10L	0001 000045	100L	0001	0000266	1290L	0.701	000400	1766	5001	000353	2150L
0001 000146 550L	0001 000233	=	SOVO R	0000007	A	0003 R	0000000	AESOR	5503 R	000620	ABSERC
0503 R 001320 ADSORO	9004 R 900764		5000 R	0000010	8	0000 R	000013	EETA	0000 R	000011	c
0004 R 001750 CFRESS	9000 R 500012	D	CCCM R	002200	CEFAUL	0004 R	001449	DELTRA	0004 R	001604	EFRESS
0004 k 002114 Eilen-5	CC03 R 551516	EXFUND	ಲಾಣಕ <u>ಸ</u>	200144	EXECT4	9993 R	0000032	EXECUS	7093 R	CC1154	CXLCt to
00014 & 50X0454 HE1617	0004 R 000620	HUM	00005 1	970001	I	DOMEST I	OWWE	INDEX	0000	CAXXXX	(NJE \$
0000 000056 INJF\$	9003 R 000310	INTER	00000 I	000017	J	OWN R	5000052	CNE		501135	•
0034 R 002424 020NE	00000 R 0000005	FRATIC	DOWN R	000004	FRATIO	0004 R		-		1411454	
0004 R 000310 TEMPER	00000 R 000000	TRANS	0000 R	000006	TRANSC	0004 R	(7.)1274	TRANSM		000471	
DOOD R SUXXIIS TRANSO	0000 R 000014	TRANSR	0000 R	0000016	TRASUM	9000 R	00000003	TRATIO	0004 R	000144	WATER
0000 R 000021 WEIGH	0003 R 000644	WEIGHT									

FUNCTION TRANSAF, W. WC, WO, LEVEL) 00101 1* 00101 24 c THIS FUNCTION COMPUTES THE FERCENT TRANSMISSION THROUGH WATER VAPOR 00101 3* IN THE MANNER SUGGESTED BY DAVIS AND VIEZEE FOR THE WAVE NUMBER RANGE 00101 4# 25 TO 2150 17CH. IT IS SUPPLEMENTED BY MOSKALENKO TRANSMISSION 00101 5# c FUNCTIONS FOR OZONE 00101 7# 00101 REAL INTER (00103 8* PARAMETER STZFTH=150 9¢ 00104 PARAMETER SIZTRA=150 00105 10+ COMMON/Z1/ ABSORGSIZTRA), EXPONGSIZTRA), INTERGSIZTRA), 00106 11* RESPONZSIZTRA), ADSORCA15), EXPONCA15), 12# 00106 WEIGHT@SIZTRA), EXFCHOUSIZTRA), EXFOND@SIZTRA), 00106 13# ABSORO451ZTRA) 00106 14* COMMON/ZZ/ FRESSESIZETH), WATERESIZETH), TEMPERESIZETH), 00107 15* HEIGHTASI7FTH), HUMASIZFTHI, ATCENTASIZFTH), 00197 16# OTCENTasizeth), TRANSMasizeth), DELTRAUSIZETH), 00107 17#

```
00107
         164
                                  EPRESSASTZPTH), CFRESSASTZPTH), ETEMPSASTZPTH),
00107
         194
                                  CEFAULASTZETH) (OZCREASTZETH)
00110
         21.4
                     TRANS=1.
0.0111
         21¢
                     IF4W.LE.U.1 GO TO 2150
00111
         22#
               c
C/3111
         234
                     USE WAVENUMBER TO COMPUTE AN INCEX
CO111
         24#
00113
         25¢
                     I=aF-12.51/25.
GO114
         264
                     CNE=1.
00114
         27¢
               c
00114
         28≑
                     COMPUTE PRESSURE AND TEMPERATURE RATIOS AT THESE STANDARD VALUES
               c
00114
         29≄
00115
         3.14
                     TRATICE1.
00116
         31¢
                     PRATICE1.
00117
         324
                     PRATIC=1.
06129
         33¢
                      IF4LEVEL.E4.1) GO TO 100
03122
         34¢
                      TRATIC= GETEMPS GLEVEL) + ETEMPS GLEVEL-1)1/546.32
DG123
                     FRATIC=MEFRESSMLEVEL) +EFRESSMLEVEL-1)) /2026.4
         35¢
D0124
         364
                     PRATIC=aCFRESS-LEVEL)+CFRESS-LEVEL-1))/2026.4
00125
         37¢
               100
                     CONTINUE
00126
                      IF41.6E.32) GO TO 800
         38*
66136
                      TRANSC=1.
         394
00131
         4Cr≄
                      IF41.LT.22) 60 TO 550
00131
         41#
               c
60131
                     COMPUTE TRANSMISSION DUE TO CARBON DIOXIDE
         42*
               c
00131
         43#
               c
CC1133
          44*
                      A=.4-a.15) #ALOG1@@RATIC)+1.6
00134
                     B=ABSCRCal-21) #LCD4.87+aFRATICHMA.8)))#FRATICHMA
         45≄
(2)135
         464
                      C=TRATIO##EXECUC#1-21)
00136
          47¢
                      D=a.4) ##FRATIC### (8))
00137
          48≠
                      TRANSC=EXFa-aD+auaD+C+ONE)++.5)-ONE)))
00137
         49*
              ζ
00137
          50.⇒
               c
                      SEARCH AND INCLUDE OZONE TRANSMISSION FOR THIS INTERVAL
00137
               ¢
00149
          52#
                      TRANSC=TRANSC#TRANSO(1)
00140
          53
               c
00140
          54#
               c
                      COMPUTE TRANSMISSION DUE TO WATER VAFOR
00149
          55≉
               c
00141
          56.
               550
                     CONTINUE
00142
          57≄
                      BETA=.76+a.58+a.48+aFRATIO=+2)))++.5
00143
          584
                      A=AESORdI) #WMdTRATIO CEXFONAI))
00144
          59*
                      B=1.+43.17#EETA##FRATIO###-1.1))#A)
00145
          €£i#
                      C=BETA##FRATIO##-.1))#A
00146
          61 #
                      TRANSR=EXF4-C+48444-.5)))
              c
00146
          62#
                      MULTIPLY THE CARBON-DIOXIDE AND WATER VAPOR TRANSMISSIONS
00146
          63.⇔
               C
00146
          64*
00147
          65≄
                      TRANS=TRANSR=TRANSC
60156
          ōō#
                      60 TO 2150
توروي
          67%
                      CONTUTE TRANSMISSION IN THE WATER VAFOR "WINCOW".
00150
          ¢ಲಘ
               σ
00150
          69⇒
                c
00151
          7U#
                800
                      CONTINUE
00152
          71#
                      ffal.6E.48) 60 to 1200
                      TRANS=EXPa-aABSORa[) ##FRATIO) ##EXFONa[))
GO154
          72±
 00154
          73¢
               ¢
 GO154
          74#
               c
                      SEARCH AND INCLUDE OZONE TRANSMISSION FOR THIS INTERVAL
```

```
00453
                      DO 311 J=1,84
        315¢
                      IFUNCT = aRESECNAU) #155.1+48
G0456
        3164
                       JEUNCT =aRESPONKJ+1)#100.1+48
00457
        3174
                      CALL LINEVA920+J. JFUNCT ,921+J. JFUNCT)
DO469
        3184
                311
00462
        319¢
                       Y=!).
00463
        320#
                      DO 312 J=1,5
                       Y=Y+10000.
00466
        3214
G0467
        322¢
                       X=11.
00479
        323#
                       XF=-2.
D0471
                       CALL LINEVANXVAXE), NYVAY), NXVAX), NYVAY))
        324≠
                       HEADER43)=" "
DU473
        325¢
                       ENCODE#24, HEADER) ANGLE
CA3474
        326:
00477
                       CALL FRINTVA18, HEADER, 753,64)
                       HEACER(3)=" "
00500
        328≠
                       ENCODE#25, HEADER) TEMPER#1)
00501
         329#
G(150)4
         339%
                       CALL FRINIVALE, HEADER, 703, 80)
                       HEADER41) = "TEMP C"
GO505
         331¢
                       HEADER#2) = "ORRECT"
00596
         332±
                       HEADER43)="ICN C"
GO597
         333¢
                       CALL PRINTYGIS, HEADER, 500, 801
00519
         334$
                       HEADER#1)="ALTITU"
00511
         335≄
                       HEACERd2) = "CE"
00512
         336*
00513
         337¢
                       HEADER43)="FEET"
                       CALL AFRITYOUT, -14,18, HEADER, 60,900)
00514
         338≑
                       HEADER41)="SURFAC"
00515
         339≄
00516
         345%
                       HEADER42) = "E"
                       CALL FRINTVAT, HEADER, 60, 115)
00517
         341#
                       HEADER#1) = "15000"
00520
         342=
 00521
         343*
                       CALL FRINTV45, HEADER, 70, 252)
 UG522
         3444
                       HEADERGI) = "ACCOOK!"
                       CALL PRINTVAS, HEADER, 75, 393)
 DJ1523
         345#
                       HEADER41)="300000"
 00524
         34G#
                       CALL PRINTVA5, HEADER, 70, 535)
 DC)525
         347≑
                       HEADERGI)="40000"
 00526
         346≑
                       CALL FRINTVAS, HEADER, 70, 670)
         349≑
 0.0527
                       HEADER#11 = "5100000"
 00530
         359*
                       CALL PRINTY45, HEADER, 75,818)
 00531
         351 ≄
                       HEADER#1) = "600000"
 00532
         352
                       CALL PRINTYES, HEADER, 75, 955)
 00533
         3534-
 00534
         354¢
                       CALL CHSIZVa3,5)
                        CALL RITE2Va105,1000,1000,90,1,60,1,MCSSAG,NLAST)
 00535
         355≑
                        THETA=RADMANGLE)
 00536
         356#
 00537
         357¢
                       LIMOLIMIT-1
 00549
         358≉
                        CALL OFATHS
                       LIMIT=1
 D0541
         359¢
                        DO 20 J=1.LIM
 00542
         369*
 00545
         361 ≉
                        LIMIT=LIMIT+1
                        CALL RADATO
 UU546
         35/ ₹
                        CONTINUE
 (14)5 4 7
          *63+
 00551
          3644
                        60 TO 100
 00551
         365≉
                        INFUT RESPONSE FUNCTIONS AS FERCENTAGES AT MIDFOINTS OF EACH
 09551
         366¢
                 c
 D0551
          367≄
                 c
                        INTERVAL
         368*
                 c
 00551
 00552
         369≉
                 200
                        CONTINUE
                        LEACER#11#HEACI
         375¢
 D0553
                        LEADERa2)=HEAD2
 00554
         371#
```

```
LEACER#3)=HEAC3
00555
        3724
(K)556
        373¢
                     VG11E46.19)
00560
        3744
                     00 30 1=1,65
                     RESPONATO =5.
00563
        3750
                     po 40 1=1 ¡L181T
00565
        3764
                     READAS, 15) INTERV, FUNCTI
69579
        377¢
                     WRITE46,16) INTERV, FUNCTI
00574
        3764
                      J=aINTERV-12.5)/25.
00,600
        379¢
                     RESECURITY = FUNCTI
00601
        38170
               417
CO603
                      CO TO 100
        3614
00603
        382#
                      INPUT THE TEMPERATURE RANGE OF THE BLACK-DODY INTENSITY/
00603
        383¢
               c
00603
        3844
                      TEMPERATURE SCALE IN CENTIGRACE
00603
        3850
                     READ45,15) TRANGE
CC6/34
        366#
               4003
00607
        387#
                      WELTERS, 18)
00611
        388#
                      WRITE46,16) TRANGE
                      60 TO 100
D0614
        389¢
00615
        39:)+
               51.0
                      CONTINUE
                      CALL PLINDa(I)
D0616
        391*
                      CALL FLTERM
00617
        392*
0.0629
        393¢
                      STOF
00620
        394#
                      INPUT DISPLAY LACELS
00680
        395¢
               c
00620
        396*
00621
        397#
                600
                      READAS, 26) aMESSAGaI), [=1,10)
00627
        398*
                      60 TO 100
                      CONTINUE
0.630
                800
        399*
00630
        4004
                c
                      READ DEFAULT PROFILES AND INTERPOLATE MISSING DATA
00630
        401¢
                c
00630
        4924
                c
                      IFASTEPSZ.GT.D) CALL STEPER
                                                                                                   NEW
00631
         4933±
                                                                                                   NEW
00633
         494*
                      WRITE46,35)
                      READAS, 33, END=190) FRESSP, OZONEP, TEMPRE, HUNIDP
00635
        405*
                                         PRESSPIOZONEPITEMPRE, HUMIDP
00643
                      WR I TE 46,33)
        496#
                      DO 620 J=2.LIMIT
00651
         407à
00654
         408÷
                      READAS, 33, END=100) FRESUR, OZONES, TEMPOR, HUMID
                      WRITE46,33)
                                         PRESUR, OZONES, TEMPOR, MUMID
00662
         4094
00662
         4106
               C
                      SCAN REQUESTED LEVELS FOR DEFAULT PRESSURE WINDOW
00662
         411*
                c
00662
         412*
                      DO 610 I=2,LEVELS
00670
         4134
                      IFAFRESSAI) .LT.PRESSP.AND.FRESSAI) .GE.FRESUR) GO TO 815
00673
         414#
                      60 TO 819
00675
         415*
                      CONTINUE
                815
00676
         4164
00676
         4174
                c
                      INTERPOLATE MISSING TEMPERATURE
00676
         418*
                c
         419¢
00676
                c
                      IFATENPERAL).CT.1000.) TEMPERAL)=TERRAPRESSF, FRESUR, TEMPRE, TEMPOR,
09677
         420*
         121-
                      ÷ FRESS≅II)
22577
00e77
         122-
                C
                       INTERFOLATE MISSING SPECIFIC HUMIDITY
00677
         4234
                c
         424*
 D0677
                      IFAFLDA3,1,CEFAULAI)).EQ.1) HUMAI) = TERFAPRESSF, FRESUR, HUMIDF, HUMID
         425*
00701
                      00701
         4254
         427#
                C
 00701
                       INTERPOLATE MISSING OZONE
         428#
 00701
```

```
00701
        429¢
00703
        4354
                     IFaFLDa2,1,DEFAULa1)).EQ.1) OZONEa1):TERPaFRESSP,FRESUR,OZONEF,
00703
        431 0
                    # OZCNES,PRESSall)
00705
        432¢
                    CONTINUE
00705
        4334
               c
00795
        4344
               •
                     FETCH NEXT LEVEL DEFAULT FARAMETERS
00795
        435¢
00707
                     PRESSO=PRESUR
        4364
0237113
        437¢
                     OZCMEP=QZCNES
00711
        458#
                     TEMPRE=TEMPOR
00712
                     HUHICF=HUMIC
        439=
00713
        440±
               820
                    CONTINUE
GO715
        4410
                     60 TO 196
00715
        4420
               ¢
05715
        443*
                     INPUT TRACE GAS TRANSMISSION FUNCTIONS WHERE
03715
        444#
               c
00715
        445¢
               c
                     WEIGHT TRUNCATED TO AN INTEGER IS AN INDEX TO THE WAVENUMBER
C0715
        4464
               C
                             INTERVAL FOR WHICH THIS ANALYTIC FUNCTION APPLYS
00715
        447±
00715
        4484
               c
                     WEIGHT FRACTION IS THE GEONETRIC MEAN WEIGHTING MODIFIED BY THE
00715
                            FLANCKIAN FUNCTION FOR THE WAVE-NUMBER INTERVAL FRACTION
        4494
               c
00715
        450¢
               ¢
                             OF THIS ANALYTIC FUNCTION
00715
        451¢
00715
                     AESORO = A
        452$
               C
                                       THESE ARE PARAMETERS APPEARING IN ANALYTIC
00715
        453¢
               c
                     EXFOND = B
                                       FUNCTIONS OF THE FORM AMAZIMOS-CENTAGE (MERMIC)
00715
        454☆
                     EXFOND = C
                                       FOR THE INTERVAL AND WEIGHTING DESCRIBED ABOVE
00715
        4550
               C
00716
        4564
               1100 CONTINUE
00717
        457#
                     WRITE46,31) HEAD1, HEAD2, HEAD3
00724
        458#
                     DO 1110 1=1,LIMIT
00727
        459*
                     IFal.GT.195) 60 to 195
00731
        46/1≄
                     READAS, 28, ENG-153) WEIGHTWI), AESOROWI), EXPONDAI), EXPONDAI)
00737
                      II=WEIGHTal)
        461#
00740
                     WEIGH=WEIGHTaI)-II
        462*
00741
        463≠
                     BEGIN=INTERALI)-12.5
00742
        464×
                     FINIS-INTERALI)+12.5
00743
                     WRITERG, 29) BEGIN, FIRIS, ABSOROWI), EXPONDRI), EXPONDRI), WEIGH
        465¢
               1110 CONTINUE
QJ753
        466≠
00755
        4674
                     60 10 199
00756
        468#
                     FUNCTION SPHEREA +, L)
00756
        469*
00756
        470+
                      THIS IS A CONDITIONAL FUNCTION WHICH MODIFIES THE FRECIPITABLE
00756
                      WATER AT SATELLITE ALTITUDES FOR THE SPHERICAL SHAPE OF THE
        471#
                      EARTH
00756
        472#
               c
DD756
        473*
               ¢
00761
         474#
                      SFHERE=1.
00762
        475≎
                     IF4.NOT.SHELL) RETURN
00762
        4767
                      THEY TO THE STATE OF THE MAKE OF OPERALITIES TO THE HARETON
MOTES
         4774
00762
        478*
                      TEST=20898696./420898696.+HE1GHT4L))
00764
        479#
00764
         480#
00764
                      NO COMPUTATIONS ARE MADE WIEN THE FIELD OF VIEW IS ABOVE THE
        461*
                      HORIZON
00764
        4824
00764
         483*
                c
00765
                      IF THETA.GT.ASINATESTED RETURNS
        4840
00765
        485¢
               c
```

```
00765
        486¢
             ¢
                    HIGH IS THE AVERAGE HEIGHT OF THE WATER VAPOR LAYER
0.1765
        487¢
              C
CV:767
        4884
                    HIGH-aHEIGHTAL) +HEIGHTAL-111/2.
00767
        4695
              c
00767
        490¢
                     ADD THE AVERAGE HEIGHT OF THE LAYER TO THE RADIUS OF THE EARTH
00767
        4914
              C
60770
        492+
                     FART1=HIGH+20898696.
00770
        493¢
00770
        4944
                     MULTIFLY BY THE MEAN INDEX OF REFRACTION AT THE AVERAGE HEIGHT
00779
        495¢
                     OF THES LAYER
00779
        496*
05771
        497¢
                     PARTZ=PART1 #4REFRAX4L) +REFRAX4L-1))/2.
00771
        4984
00771
        4994
                     MULTIPLY BY THE INDEX OF REFRACTION AT THE HEIGHT OF THE SENSOR
03771
        5000
                     AND BY THE SINE OF THE ANGLE OF CESERVATION
D3771
        501 ±
              c
00772
        5024
                     FART3=FART1=REFRAXAL) #SINITHETA)
00773
        5034
                     PART4=SQRTquPART24PART2) - LPART34PART3))
00773
        504=
0.773
        505≄
                     COMPUTE THE MEAN FUNCTION ASSUMING THE OBSERVING SENSOR IS JUST
00773
        596%
              C
                     ADOVE THE MEAN LAYER TO WHICH IT IS APPLIED
00773
        557¢
              c
00774
        50.00
                     SPHERE:FART2/FART4
00775
        $'`9÷
                     RETURN
00776
        515a
                     SUBROUTINE DISPLY
00776
        511≠
D0776
        512*
                     THIS SUPROUTINE DISPLAYS THE MIDIFIED DATA BASE
              C
00776
        513#
              c
01001
        5144
                     WRITE46,11)
01003
        515‡
                     00 10 I=1,LEVELS
01006
              10
                    WRITEGG, 12) FRESSAID, MUNAID, TEMPERAID, OZONEGI)
        516*
01015
        517¢
              11
                    FORMATA*1PRESS SPECIFIC TEMP
                                                         OZOLE",/,
01015
        5184
                                       HUNIDITY SOUNDING",/,
01015
                            • нв
        519#
                                      GM/KGM
                                                          GM/KGM*)
                                                 K
01016
        520t
              12
                    FORMAT@1X,F7.1,1X,E10.5,2X,F6.2,1X,E10.5)
01017
        521≄
                     LIMIT=LEVELS
01029
        522*
                     RETURN
01921
        523¢
                     FUNCTION TERFAX1, X2, Y1, Y2, X)
01021
        5244
              c
01021
        .525¢
                     THIS FUNCTION FERFORMS LAGRANGIAN INTERPOLATION
01021
        526#
               c
D1024
        527*
                     SLOFEA=4X-X2)/4X1-X2)
01025
                     SLOPEE=ax-x1)/ax2-x1)
        528≄
01026
                     TERP=SLOFEA#Y1+SLOFEE#Y2
        529*
01027
        53F-4
                     RETURN
01939
        531*
                     SUBROUTINE CHATHS
01030
        532≄
01038
        5534
               C
                     THIS SULRCUITE COMPUTES ANGLE DEFENDENT OFFICAL FATHS
01030
        53/A
01033
                     FWHY FED.
        535*
01034
        3350
                     TWHOLE=D.
01035
        537¢
                     00 16 1=2,L1H1T
01040
                     OTCENTal)=OTCENtal+1)+aPRESSal+1)+PRESSal))+aQZCNEal)+OZCNEal-1))+
        538*
01040
        539≠
                    237.968
01641
        549¢
                     WATERal)=WATERal-1) +aHUMal) +SPHEREa$10, 1) +aFRESSal-1) -FRESSal)))/
D1041
        541¢
                    980.
01042
        542*
                     PRESUR= @FRESSal) + PRESSal-1))/2.
```

```
01043
       5434
                     TEMPOR=aTEMPERAL)+TEMPERAL-11)/2.
01044
        5440
                     IFa1.61.1)
G1044
        5454
                    #HEIGHTaI)=HEIGHTaI-1)+29.34TEMFCR#ALCGaPRESSaI-1)/PRESSaI))
01044
        5464
                    $085.8¢((I)4MUH019000.+.1004
01046
        5474
                     ATCENTal)=aFRESSal)-FRESSal))+.260
01047
        5484
                     EMPLE=EMPLE+WATER(()-WATER(1-1)) (PRESUR
01050
        549æ
                     TWICLE=TWICLE+4WATER41)-WATER41-1))+TEMFOR
01051
        5500
                     CPRESSal) = aFRESSal) + PRESSal))/2.
01052
        351¢
                     EFRESSAID = EWHOLE /WATER at 1)
01053
        352¢
                     ETEMPSal) = TWHOLE /WATERal)
01054
        553≄
              10
                     CONTINUE
01056
        554*
                     RETURN
01057
        555%
                     SUCROUTINE STEPER
01057
        556¢
01057
        557
              c
                     THIS SUBROUTINE EXPANDS OR CONTRACTS THE DATA TO THE NEEDED STEP SIZE
01057
        558#
              Ç
01062
        5594
01063
        560+
                     LODINT=HINAFRESSa1) /STEPSZ, $1ZFTH)
01063
        561≑
               ¢
01963
        562÷
               C
                     TEST FOR END OF AVAILABLE DATA
01063
        563*
               ¢
D1G64
        564*
                     IF4J.GT.LCCINT) RETURN
01064
        565#
               c
01964
        $66*
               c
                     SET AVAILABLE DATA
01964
        5674
               Ç
01066
        568¢
                     PRESSP=FRESS4J)
01067
        569≄
                     PRESUR=PRESSAU+1)
01070
        575#
                     TEMPRE=TEMPER«J)
01071
        571#
                     TEMPORETEMPERA (+1)
01072
        572¢
                     OZONEF=OZONEau)
01073
        573*
                     OZONES:=OZONE@J+1)
01074
        574≑
                     HUMIDP=HUMxJ)
01075
        575¢
                     HUMID=HUM(J+1)
D1075
        576×
               c
01075
        577÷
              C
                     SET WANTED DATA
01075
        578#
              C
D1076
        579≑
                     PREWAN=PRESSA1)-STEPSZ#J
01076
        589#
               c
D1076
        581 <del>1</del>.
               c
                     WOORLY ATAD BLEALING MITHIN ATAD CETAM RI-
01076
        582±
               C
01077
        583#
                     IF AFREVANILTIFRESSPIANCIPREWANIGE PRESURT GO TO 10
01101
        584*
                     60 TO 40
01102
        585#
               10
                     CONTINUE
01102
        586*
               c
01102
        587≎
               c
                     HOW MANY LEVELS OF WANTED DATA ARE WITHIN WINDOW
01102
        5884
               Ċ
01103
        589*
                     LODSIZ=#PRESSF-PRESUR)/STEPSZ
01103
        59∏∻
               c
01103
        591¢
                     MAKE SPACE IN AVAILABLE DATA FOR WANTED DATA
01103
        592*
               Ċ
01104
        593≄
                     DO 20 KELEVELS.J,-1
01107
                     PRESS(K+LODS12) =FRESS(K)
        594÷
01110
        595#
                     TEMPERAK+LODSIZ) = TEMPERAK)
01111
        596*
                     OZONEAK+LODSIZ)=OZONEAK)
01112
                     HUHaK+LODS (Z) = HUNAK)
        597#
              29
01114
        $98#
                     LEVELS=LEVELS+LCCS!Z
01114
        599+
```

```
LOAD CATA OVER WANTED INTERVAL
 01114
          647414
                 C
 01114
          651 ≄
                 C
  01115
          6024
                       DO 30 K=1,LCCSIZ
          603*
  01129
                       TEMPERALD = TERFORESSF , FRESUR , TEMPRE , TEMPCR , FREWAN)
 01121
          6944
                       OZONEWI) = TERPMPRESSP, PRESUR, OZONEP, OZONES, PREWAN)
  01172
          60.50
  01123
          656%
                       HUMAU) =TERFAFRESSF.PRESUR,HUMIDF.HUMID.PREWAN)
                       FRESSAU) = FREWAN
01124
          6074
                       FREWANSFREWAN-STERSZ
  01125
          608¢
  01126
          609¢
                       DEFAULAJ)=DEFAULAJ-1)
                       CONTINUE
  01127
          61.14
                 30
  01127
          611#
                 c
                       RESET BOTTOM LEVEL OF AVAILABLE DATA
  01127
          6124
                 Ç
  01127
          613=
                 c
                        60 TO 5
  01131
          614#
  01132
          6150
                 49
                       CONTINUE
  01132
          616*
                 ¢
                        CESTROY TOP LEVEL OF AVAILABLE CATA
  01132
          6174
                 c
  01132
           618≄
                 c
                        DO 50 K=J,LEVELS
  01133
          619$
                        FRESSAK+1)=PRESSAK+2)
  01136
           62.63
                        TEMPERAK+1)=TEMPERAK+2)
  01137
           6214
  01149
                        QZQNEqK+1)=QZQNEqK+2)
           622÷
                        HUMEK+1)=HUMEK+2)
  01141
           623¢
                        DEFAULUK+1)=DEFAULUK+2)
  01142
           624*
  01143
           6254
                        CONTINUE
                        LEVOLS=LEVELS-1
  01145
           6264
                        60 TO 5
  D1146
           62/#
  01147
           6284
                        ENC.
```

END OF COMPILATION'

NO DIAGNOSTICS.

PREP TFF\$.

FURPUR 0258-08/20-18:50

```
00154
         75+
               c
                     TRANS=TRANS#TRANSCHI)
00155
         75*
041156
         77+
                     60 to 2159
00156
               c
         76+
00156
         79+
               Ç
                     COMPUTE TRANSMISSION DUE TO WATER VAPOR.
00156
         #()#
               C
00157
         814
               1200 CONTINUE
                     BETA=1.18+ 41.38+.48+4FRATIO+42))++.5
001160
         82+
00161
         83+
                     A=ABSOR41)#W
00162
                      B=BETA+@PRATICOM4-.15))+A
         64+
00163
                     C=#1 .+#4 .9#DETA=#FRATION##-1 .151 ) #A) ) ###-.5)
         854
                      TRANS=EXP4-484C))
00164
         $6#
00164
         87*
00164
         88+
               c
                      SEARCH AND INCLUDE OZONE TRANSMISSION FOR THIS INTERVAL
00164
         89+
               C
                      IFe1.GE.78) TRANS=TRANS#TRANSD#1)
00165
         904
               2150 RETURN
00167
         91+
                      FUNCTION TRANSOUT)
00170
         92+
00173
          93#
                      TRASLMED.
                      TRANSO=1.
00174
          94*
                      00 10 J=1,100
          95#
00175
                      INDEX=VEIGHTAJ)
00200
          964
00200
          97+
               c
                      USE DATA WITHIN THE CURRENT WAVENUMEER INTERVAL
          98*
00200
                c
          900
                ¢
002:00
                      IFRINDEX.NE.I) GO TO 10
100200
         100
00203
         161+
                      X3CHI-(LATHO)3HELL
                c
00203
         102+
                      COMPLITE MOSKALENKO TRANSHISSION FUNCTIONS FOR OZONE USING TRACE
00203
         1034
                C
00203
         104+
                      GAS COEFFICIENTS
00293
         105*
                c
         1064
                      B=AESORORJ) #46/05/EXPONORJ) ) #4FRATIO#4EXPCNORJ) }
00204
 00204
         107*
                c
                      APPLY PLANKIAN WEIGHTING FUNCTIONS TO THE TRANSMISSION VALUES
 00204
         1084
                c
 00204
                c
         1094
                      TRASLM=TRASLM+EXF4-B) #4EIGH
 00205
         110+
 00206
         111+
                      CONTINUE
                      IF aTRASEM.GT.O.) TRANSCETRASEM
         112*
 00210
                      RETURN
 00212
         1134
 00213
         114#
                      90
```

END OF CONFILATION

NO DIAGNOSTICS.

FOR.8 TRANS/SLANT, TRANS, TRANS/SLANT FOR 94L-08/20-18/50 40,0)

FUNCTION TRANS

ENTRY POINT GW356

STORAGE USED: CODE41) DIXISTO DATAGO DIXIGOS BLANK COMMONAZI DIXIXIO

COMMON BLOCKS!

0003 Z1 001464 0004 Z2 015530

EXTERNAL REFERENCES «ELOCK, NAME)

0005 NEXF68 0006 ALCG10 0007 EXP 0010 NERR3\$

STORAGE ASSIGNMENT MELOCK, TYPE, RELATIVE LOCATION, NAME)

0001 000447 IDL	0001 000045 19	OOL 0001 (DXX266 129XL	0051	000400 1766	0001	DGG353 215GL
0001 000146 559L	0001 000233 80	0000 R 9	000007 A	DUXIS R	0000000 ABSCR	0003 R	5001629 ADSCR
0003 R 001329 ABSORO	DOMA R 00347/34 AT	TCENT CXXXX R :	000010 B	SUUD R	SUSSI3 BETA	0000 R	909011 C
0004 R 011610 CPRESS	90000 R 9000012 D	OXM R	D13560 DETAUL	CCC4 R	907640 DELTRA	0004 R	U10624 EPRES!
DD014 R 012574 ETEMPS	DXXXX R DXXXXX EX	XPOND DXXXX R 1	SCICITAR EXPON	0003 R	MARKS EXECUTE	COO3 B	001151 EXTOR:
0004 R 002734 HEIGHT	0004 € 003720 HU	UM 0000 1 1	000001 T	0000 1	OCCUSS INDEX	0000	CODUSE INJES
0000 000056 INJF\$	DOOR R DOORS IN	NTER 0000 1	000017 J	0000 R	D000003 ONE	9004 R	005675 OTCENI
0004 R 614544 OZONE	D0000 R 0000005 FR	RATIC GUND R	DUXXU4 PRATIO	0004 R	DOCCOO PRESS	0003 R	UXXI454 RESPCI
0004 R 001750 TEMPER	9000 R 900000 TR	RANS SOUR R	000006 TRANSC	0004 R	UD6654 TRANSM	0001 R	OCCI471 TRANS
DOOD & DOORS TRANSO	9000 R 000014 TR	ransr - Olygo R	DUXX16 TRASUM	0000 R	SUCCOS TRATIO	9554 R	DO0764 WATER
0000 & 000021 WEIGH	9003 R 000644 WE	EIGHT					

```
FUNCTION TRANSAF, W. WC, WO, LEVEL)
00101
          1+
00101
              ¢
                     THIS FUNCTION CONFUTES THE FERCENT TRANSMISSION THROUGH WATER VAPOR
00101
          3*
               c
                     IN THE MANNER SUGGESTED BY DAVIS AND VIEZEE FOR THE WAVE NUMBER RANGE
00101
               C
          4*
                     25 TO 2150 1/CM. IT IS SUFFLEMENTED BY MOSKALENKO TRANSMISSION
00101
          5*
               C
00101
                     FUNCTIONS FOR OZONE
          6#
00101
          7#
00103
          8*
                     REAL INTER
00104
          94
                     PARAMETER SIZPTHESSS
                     FARMIETER SIZTEM-155
00:05
         154
                     CORDINATION - ADSORADIZTRAN, EXFONADIZTRAN, INTERASIZTRAN,
00106
        11+
                                  RESPONASIZTRA), ABSORCA19), EXPONCA19),
00106
         12#
                                  WEIGHTESIZTEA), EXPONDESIZTEA), EXPONDESIZTEA),
00106
        13*
                                  ABSORO#SIZTRA)
00106
        14*
                     COMMON/ZZ/ FRESSASTZPTH), WATERASTZPTH), TEMPERASTZPTH),
00107
        15*
                                  HEIGHTASIZPTH), HUNGSIZPTH), ATCENTASIZPTH),
00107
        16#
                                  OTCENTASIZETH), TRANSMASIZETH), CELTRAASIZETH),
00107
        17#
```

```
00107
         160
                                  EPRESSASIZETH), CERESSASIZETH), ETEMPSASIZETH),
60197
         194
                                  DEFAULASIZETHO . OZCNEWSIZETH)
00110
         25.4
                     TRANS=1.
00111
         214
                     IFAW.LE.O.) 60 TO 2150
00111
         52¢
               C
00111
                     USE WAVENUMBER TO COMPUTE AN INCEX
         234
               C
00111
         24≠
               c
00113
                     I=aF-12.5}/25.
         25¢
00114
         264
                     ONE=1.
00114
         27#
               c
00114
               c
                     COMPUTE PRESSURE AND TEMPERATURE RATICS AT THESE STANDARD VALUES
         294
(2)114
               c
         29¢
00115
         30. n
                     TRATICE1.
00116
         31¢
                     FRATIQEI.
0.117
                     FRATICES.
         324
00120
         33¢
                     IF4LEVEL.EQ.1) 60 TO 100
00155
         34¢
                     TRATIO=GETEMPSGLEVEL)+ETD4FSGLEVEL-1))/546.32
00123
                     PRATIC=@EFRESSALEVEL) +EFRESSALEVEL-1))/2026.4
         354
00124
         36.a
                     PRATIC=aCFRESSaLEVEL)+CFRESSaLEVEL-1))/2026.4
00125
         37¢
               100
                     CONTINUE
00126
                     IF41.6E.32) 60 TO 800
         30+
60139
         39☆
                     TRANSC=1.
00131
         40<del>+</del>
                     IF41.LT.22) 60 TO 559
00131
         41#
               ¢
00131
                     COMPUTE TRANSMISSION DUE TO CARBON DIOXIDE
         42☆
               C
00131
         434
               c
D0133
         44≑
                     A=.4-d.15) #ALOGIG#FRATIC)-1.6
00134
                     B=ABSCRCal-21) <44C+4.87+4FRATIC++4.8))) +FRATIC++A
         454
00135
         46#
                     C=TRATIO##EXPONCa1-21)
00136
         47#
                     D=a.4) papRATIC($a.8))
00137
         48#
                     TRANSC=EXPa-aD####E#C+ONE) ##.5) -CHE)))
00137
               c
         494
00137
         5Y)#
               c
                     SEARCH AND INCLUDE OZONE TRANSMISSION FOR THIS INTERVAL
00137
         51 ¢
               ¢
00140
         524
                     TRANSC=TRANSC#TRANSOx1)
00140
         53¢
               c
00140
         54¢
                     COMPUTE TRANSMISSION DUE TO WATER VAPOR
00149
         55¢
               C
               559
00141
         564.
                     CONTINUE
00142
         57#
                     BETA: .76+a .58+a .48+aFRATIOxx2})) ##.5
00143
         58≉
                     B=1.+43.17#EETA##FRATIO###-1.1))#A)
00144
         59≄
00145
         6D≉
                     C=BETA+GERATIO:=44-.1))+A
00146
                     TRANSR=EXF4-C+40++4-.5)))
         61 🌣
               c
DO146
         62÷
                     MULTIPLY THE CARBON-DIOXIDE AND WATER VAFOR TRANSMISSIONS
00146
         63≠
               C
00146
         64≑
DO147
                     TRANS=TRANSR+TRANSC
         65≉
00150
         €5≑
                     60 TO 2150
na en
         :::
DO LOD
         69+
               C
                     COMPUTE TRANSMISSION IN THE WATER VALOR "WINDOW".
00150
         69#
               c
00151
         79¢
               850
00152
                     IF41.GE.48) GO TO 1200
         71#
                     TRINS=EXPa-aABSORal) #WYFRATIO) ##EXPONal))
DO154
         724
00154
         73+
               C
               c
                     SEARCH AND INCLUDE OZONE TRANSMISSION FOR THIS INTERVAL
00154
         74#
```

```
00154
         75#
               C
                     TRANSFTRANSGIRANSO413
00155
         760
60156
                     60 TO 2150
         77+
(20156
         700
                     COMPUTE TRANSMISSION DUE TO WATER VAPOR.
(90) 56
         79¢
               c
00156
         805
               ¢
               1290 CONTINUE
CA3157
         61#
                     DETA=1.18+ 41.38+.4854FRATIO(<(21) ⇒.5
00169
         82#
00161
         83*
                     A=ABSCGal) #W
                     EN1162
         844
                     C=a1.+a4.940ETA$\GRATIC===(-1.15)) +A)) +==(-.5)
E0163
         65¢
CO164
                     TRANSHEXFA-ABOCH)
         854
00164
         87×
               c
                     SEARCH AND INCLUDE OZONE TRANSMISSION FOR THIS INTERVAL
DO164
         456
               C
UC)164
         89¢
                      1Fal.GE.78) TRANS=TRANS=TRANSCHIT
DC:165
         904
               2150 RETURN
00167
         91*
03170
                     FUNCTION TRANSCALL)
          924
                      TRASUM=0.
00173
          934
                      TRANSO=1.
CC1174
          94#
                      001,1st 01 00
 00175
          95*
                      INDEX=WEIGHT4J)
 COSCO
          964
 00290
          97¢ €
                      USE DATA WITHIN THE CURRENT WAVENUIDER INTERVAL
 00200
          98#
               c
 00200
          99≠
               c
                      IF INDEX.NE. I) 60 TO 19
         1000
 00201
                      WEIGH=WEIGHTAU) - INDEX
 00203
         151*
         102+
 00203
                      CONFUTE HOSKALENKO TRANSMISSION FUNCTIONS FOR OZONE USING TRACE
         103¢
               c
 00203
                      GAS COEFFICIENTS
 00203
         104*
               ¢
 00253
         105#
                c
                      B=ACSCROx1) #WO##EXFOMOx1)) #WFRATIO##EXFONOx1))
 00204
         106*
                c
 00294
         1074
                      APPLY FLANKIAN WEIGHTING FUNCTIONS TO THE TRANSMISSION VALUES
 00204
         108*
                c
         109*
                c
 0.72.14
                      TRASUM=TRASUM+EXP4-B) ##EIGH
 00205
         1100
                      CONT INLE
 00206
         1114
                10
                      IF a TRASUM. GT. D.) TRANSOFTRASUM
 00210
         1124
                      RETURN
         1134
 00212
                      END:
  00213
         114*
```

END OF COMPILATION' NO DIAGNOSTICS.

FOR S COEF/SLANT, COEF, COEF/SLANT FOR 901-08/20-18:50 m0,0)

BLOCK DATA

00113

STORAGE USED! CODE41) CHANGO DAYAGO GENERAS BLANK COMMONAZI (NGCAROG

COMMON BLOCKS!

001464 00003 Z1

STORAGE ASSIGNMENT ABLOCK, TYPE, RELATIVE LOCATION, NAME)

5003 001010 EXPOND 0003 R 000144 EXPON 0003 R 900629 ABSORC 0003 001320 ABS0RO DOZDA RICKENTA A ECOD 50000 I 5000001 J 00000 1 0000000 1 9003 R 000310 INTER 00003 - 001154 EXPOND DOMES R DIXTIGUE EXPONE 0003 000644 WEIGHT 0003 R 000454 RESPON

BLOCK DATA 00101 REAL INTER 00162 24 PARAMETER SIZTRA=100 00103 3* COMMON/ZI/ ADSORMSIZTRA), EXFONASIZTRA), INTERMSIZTRA), 00104 4≎ RESPONASTZTRA), ABSORCATO), EXPONCATO), 00104 54 WEIGHTASIZTRA) (EXFCHOUSIZTRA) (EXFCNOASIZTRA) 64 CETALLS. ABSORD451ZTFA) D0194 7# 00104 80 PARAMETERS AFFEARING IN ANALYTIC EXPRESSIONS OF TRANSMISSION C 00104 9+ THROUGH WATER VARIET IN THE WAVE NUMBER RANGE 25 TO 55U 1/CH. c 00104 104 00104 11+ DATAGABSCRG[), EXPCNG[), I=1,21)/ 12* 00195 ٥., 0., 1359., 67U., 00105 13÷ 2500., ø., 2450., 0., 00105 14* G., 2550., 2190., ٥., 00105 1050., 1259., 0.. ٥., 00105 16* 710., 1.15. 955., .45, 00105 17* 1.95, 295., 410., 1.65. 00105 145.. 3.. 265., 2.6, 00105 19* 2.45, 37.5, 2.55. 53.5, 00195 20a 20.5, 1.55, 39.5, 2.75, D0195 21# 6.05, 2.3, 224 11., 1,85, 00105 1.55/ 2 3.7, 23¢ 00105 00105 24# C PARAMETERS AFFEARING IN ANALYTIC EXFRESSIONS OF TRANSMISSION 00105 25# THROUGH CARDON GIOXIDE AND WATER VAFOR IN THE WAVE NUMBER RANGE ¢ 26≉ 00105 555 TO 000 1/CH. 05165 274 C 00105 78 A DATAGABSORGI), EXPONGI), 1=22,31)/ 29* 00119 1.35, 2.1, .6, 1 2.8. 00110 3()± 1.1, o, .D. 00110 2 1.55. ٠0, .82, .0, .615. 00110 32# ٠٥, .37 .0. .47, 00110 33# .23, .07 .0, 00110 34¢ .29 DATAGABSORCGI), EXPONCGI), I=1,15)/ 35#

```
00113
                          .00145,
                                    4.7.
                                                 .0385,
00113
         37≎
                          .189,
                                    3.1.
                                               1.7.
                                                          2.2.
00113
         386
                     1
                          6.95,
                                    G.,
                                               4,8,
                                                          1.,
00113
          394
                          .53,
                                    3.9,
                                                .115,
                                                          3.6,
00113
          40.0
                          .0165,
                                    4.1.
                                                .00096,
                                                          4.7/
00113
          410
                ¢
00113
                       FARAPETERS AFFEARING IN ANALYTIC EXPRESSIONS OF TRANSMISSION
          47.0
                ¢
05113
          43¢
                       THROUGH WATER VAROR IN THE WAVE MUNEER RANGE 800 TO 1200 1/CM.
                c
00113
          444
00116
          454
                      CATAMABSORGI), EXFONCI), 1=32,47)/
00116
                                                                          .105,.880,
          464
                          .175, .775,
                                          .135, .825,
                                                          .115, .865,
                     1
00116
          47#
                     2
                          .095,.885,
                                          .091,.865,
                                                          .091,.885,
                                                                          .001,.885,
00116
          484
                          .591,.885,
                                          .091,.865,
                                                          .091,.885,
                                                                          ,091,,880,
                          .095..860.
                                                                          .125,.769/
00116
          494
                                          .195, .839,
                                                          .115,.795,
00116
          5/34
                C
                       PARAMETERS APPEARING IN ANALYTIC EXPRESSIONS OF TRANSMISSION
CO116
          51 ¢
                c
                       THROUGH WATER VAPOR IN THE WAVE NUMBER RANGE 1200 TO 2150 1/CM.
00116
          52#
                c
00116
          53¢
0.)121
          54¢
                       CATAGABSORGI), I=48,85)/
00121
                                    .42.
          554
                     1 .28,
                                               .75,
                                                         1.5,
                                                        30.,
00121
          56*
                     2 3.1,
                                    6.4,
                                              13.5,
00121
          574
                     3 45.,
                                  79.,
                                            120.,
                                                       220...
00121
          584
                      4479.,
                                  573.,
                                            295.,
                                                        87.,
                      5110.,
                                 235.,
                                                       495.,
00121
          59¢
                                            375.,
00121
                      6320.,
                                  220.,
                                            135.,
                                                        87.,
          6.4
00121
          61 ¢
                      7 52.,
                                   30.,
                                              18.,
                                                        11.,
00121
          62¢
                      8 7.7,
                                    6.,
                                               4.2,
                                                         2.8,
0.1121
                      9 1.5,
                                     .9,
          €3*
                                                .6,
                                                          .4.
DG121
                                     .2/
          644
                      1
                         .28.
00121
          65¢
(4)121
                c
                       WAVENUMBER INTERVAL MID-DINIS
          604
00121
                c
          G7¢
00123
          68¢
                       DATAGINTERGI), I=1,47)/
00123
          69#
                                      37.5,
                                                  62.5,
                                                             87.5,
                                                 162.5,
0.5123
          7.5¢
                      1
                           112.5.
                                      137.5.
                                                           187.5.
00123
          71÷
                      1
                           212.5,
                                      237.5,
                                                 262.5,
                                                           287.5,
00123
                           312.5,
                                      337.5,
                                                 362.5,
                                                           387.5,
          72#
00123
                           412.5.
                                      437.5.
                                                 462.5.
          73¢
                      1
                                                           487.5.
00123
          744
                      1
                           512.5,
                                      537.5,
                                                 562.5,
                                                           587.5,
00123
          75≄
                      1
                           612.5,
                                      637.5,
                                                 662.5,
                                                            687.5,
                                      737.5.
00123
                           712.5.
                                                 762.5.
                                                            787.5.
          764
                      1
00123
          77¢
                      1
                           612.5,
                                      837.5,
                                                 862.5.
                                                           887.5.
                                      937.5,
                                                 962.5,
00123
                      1
                           912.5,
                                                            987.5,
          784
                                     1937.5,
                                                1962.5.
                                                          1987.5.
00123
                          1012.5.
          79☆
                      1
 00123
          6∏¢
                      1
                          1112,5,
                                     1137.5.
                                                1162.5,
                                                          1187.5/
                       DATAdINTERdI), I=48,85)/
 00125
          81 ×
                                     1237.5.
                                                1262.5.
                                                          1287.5.
 00125
                          1212.5.
          824
                      1
                                                          1387.5,
 00125
          83
                      1
                          1312.5
                                     1337.5,
                                                1362.5,
                                      1437.5,
                                                1462,5,
                                                           1487.5.
 00125
                          1412.5,
          84 ÷
 00125
                          1512.5,
                                     1537.5.
                                                1562.5,
                                                          1587.5.
          85¢
                      1
 00125
                      1
                          1612.5
                                     1637.5,
                                                1662.5,
                                                           1687.5,
          86*
                          1712.5,
                                     1737.5.
                                                1762.5.
                                                           1787.5,
 00125
          87¢
                      1
 00125
          884
                      1
                          1812.5.
                                     1637.5.
                                                1862.5.
                                                          1887.5.
 00125
                          1912.5,
                                      1937.5,
                                                1962.5,
                                                           1987.5,
          894
                                     2937.5,
                                                          2587.5,
                          2012.5.
                                                2062.5,
 00125
          904
                      1
 DU125
          91+
                          2112.5,
                                     2137.5/
                       DATAGRESPONG J) , J=1 ,85) /85+9./
 0/3127
          92¢
 000131
```

END OF COMPTLATION! NO DIAGNOSTICS.

FOR 9 WL-08/20-18:50 40,00

SUBROUTINE TEMTAB ENTRY POINT 000166
TABTEM ENTRY POINT 000177

STORAGE USED! CODE(1) CROSTO DATAGO SECTION BLANK COMMON(2) CROSES

COMMON BLOCKS!

0003 21 001464

EXTERNAL REFERENCES &BLOCK, NAME)

00034 EXP 00035 NERR3\$

STORAGE ASSIGNMENT ABLOCK, TYPE, RELATIVE LOCATION, NAME)

0001	000003 10L	0001	000071	1336	9.721	000075	1376	0501	1,500,000	25°C	00001	0000053	3! L
6001	000137 40L	00001	000123	50L	0003	000000	AESOR	0003	000620	ABSTRC	0003	001329	ADSDRO
	COURTS DEGREE	0.003	001010	CHORXE	0003	U.Ci144	EXECN	9003	000632	EXECUC	90.63	001154	CNULIX
	1000001 HEATER	0000 1	000311	1	00000	00,0325	INJES	0000 R	0000000	INTEN	5003 R	00.6319	INTER
	0000314 J	0003 R	0000454	RESIDEN	9000 R	0.0316	SECCB	0000 R	000312	SLOPEA	0000 R	000313	SUCFEE
0000 F	CONTRACTOR OF THE CONTRACTOR O	D(X)3	000644	WEIGHT									

```
SUBROUTINE TEMTABADETECT, TEMPOR)
00101
              c
00101
          24
                     THIS ENTRY POINT RETURNS A TEMPERATURE IN DEGREES KELVIN WHICH
              c
00101
          3+
                     MATCHES A DETECTOR INTENSITY. IF NO MATCH IS MADE A ZERO IS
00101
              c
          54
                     RETURNED.
00101
00101
          6:
                     REAL INTEN
00163
          8¢
                     REAL INTER
00194
                     PARAMETER SIZTRA=100
00195
          9#
                     COMMON/ZI/ ADSCRASIZIRA), EXFONASIZIRA), INTERASIZIRA),
00106
         10a
                                  RESPON(SIZTRA), ABSORCa15), EXPONCa15),
         11*
00106
                                  WEIGHTUSIZTRA), EXFONDUSIZTRA), EXFONDUSIZTRA),
D0196
         12#
                                  ABSORO#SIZTEA)
00106
         13*
                     DIMENSION HEATER (100) , DEGREE (190)
00107
         14#
                     88CCYaV,T)=a8.9349E-13+V++3)/aEXPaa1.4385+V)/T)-1.5)
D9110
         15+
00110
         16≉
                     SCARCH FOR THE HEAREST INTERVAL
         1/4
071111
00114
         184
09111
         19#
                     [ = 1
         20*
00112
                     IFAL.GT.190) GO TO 39
00113
         21*
                     IFADETECT.GT.HEATERAI-1).AND.DETECT.LE.HEATERAI)) GO TO 20
00115
         22#
         23*
00117
              c
00117
         24≑
```

```
25#
                                    c
                                                    RETURN THE SOUGHT TEMPERATURE
0:3117
00117
                      26#
                                    C
00129
                      27#
                                    20
                                                    CONTINUE
                                                    SLOFEA=aCETECT-HEATERal))/WIEATERal-1)-HEATERal))
00121
                      284
                                                     SLCFEB=aDETECT-HEATERaI-1))/aHCATERaI)-HEATERaI+11)
00122
                      294
                                                    TEMPOR: SLOPEAGDEGREE#1-1)+SLOPEBGDEGREE#1)
100123
                      3.14
                                                    RETURN
0/1124
                      310
DU124
                      324
                                     c
                                                     ERROR RETURN ZERO TEMPERATURE
(V.)124
                       33*
                                     C
                       344
EX)124
                                     c
                                                     TEMPORES.
(2)125
                       35#
                                     30
00126
                       36*
                                                     RETURN
                                                     ENTRY TABLEMATENEOR, TRANSE)
00127
                       37+
 EX1127
                       384
                                     Ç
                                                     THIS ENTRY POINT GENERATES A TEMPERATURE/INTENSITY CALIBRATION
 GG127
                       39≑
                                      c
                                                     TABLE 100 DEGREES WIDE IN STEPS OF ONE DEGREE.
                       4<u>0</u>;
                                      c
 0.5127
 00127
                        41*
                                      c
                                                     DEGREEAL) = TEMFOR-TRANGE/2.
 001131
                        424
                                                     DO 40 I=1,198
 CO132
                        43#
  00132
                        44*
                                      C
                                                      INTEN IS THE TOTAL BLACKECCY INTENSITY ACCEPTED BY THIS INSTRUMENT'S
  00132
                        45*
                                                     RESPONSE FUNCTION.
  00132
                        464
  0.0132
                        474
                                       Ċ
                        48¢
                                                      INTEN=0.
  00135
                                                      00 50 J=1,65
  OG136
                        49#
                                                      IFARESPONAULLE.D.) 60 TO 50
  DO141
                        50+
  (4)143
                         51 ¢
                                                      WAVENDE INTERAJ)
                                       ¢
  00143
                        52*
                                                      COMPUTE A BLACK-DOBY INTENSITY AT THIS WAVENUMBER AND TEMPERATURE.
  GO143
                         53*
                                       C
  00143
                         54#
                                       C
                                                      SECENIESCO MANAGER SECTION OF SEC
  00144
                         35¢
                                                      INTEN-INTEN+SECRERRESECHALI)
   00145
                         56*
                                                      CONTINUE
   00146
                         57#
                                        50
  00146
                         58×
                                        c
                                                       MULTIPLY BY THE 25 1/CM INTERVAL AND DIVIDE BY 2.
                         59*
   00146
                                        C
   00146
                         6Ω≠
                                        C
                                                       CONSTRUCT A TEMPERATURE DETECTOR TABLE.
                         61 #
                                        c
   00146
   00146
                         62*
                                                       HEATERal)=INTEN#25.
   00159
                         63 t
                                                       IFaI.EQ.199) 60 TO 49
   00151
                         64*
   00151
                         65≉
                                                       INCREMENT TEMPERATURE.
   00151
                          66#
                                        c
   00151
                         67¢
                                                       DEGREEaI+1) = DEGREEaI) + TRANGE/190.
                          68*
   00153
                                                       CONTINUE
    00154
                          69#
                                         40
                                                        RETURN
   00156
                          79*
                                                       END
    DO157
                          71+
```

END OF COMPTLATION!

NO DIAGNOSTICS.

FOR 9KL-08/20-18/50 40.00

FUNCTION VAPRES ENTRY POINT 000066

STORAGE USED: CODE41) SERVICE CATAMO SERVICE BLANK COMMONARY (MERRIC

EXTERNAL REFERENCES ACLOCK, NAME)

0003 ALCG10 0004 NEXF6\$ 0005 NERR3\$

STORAGE ASSIGNMENT ADLOCK, TYPE, RELATIVE LOCATION, NAME)

0000 000023 INJP\$ 0000 R 000010 PART5	OXXXX R OXXXXXX PARTI OXXXX R OXXXXXX PART6	CONNI E CONNIG FARTZ CONNI E CONNIG FARTZ	CONTR CONTROL FARTS CONTR CONTROL TRATIO	DODO R OXXXXIS PART4 DOXIG R ODDOXIO VAPRES
--	--	--	--	--

06101	1*		FUNCTION VAFRESAT)
CE3101	54	C	THE PROPERTY OF THE PROPERTY OF THE PERTY OF
00191	34	c	THIS FUNCTION CONFUTES A VAPOR PRESSURE GIVEN A DEW POINT TEMPERATURE
00191	4#	c	IT USES THE "GOFF-GRATCH" RELATION GRECIFIED IN THE "SMITHSONIAN
00161	5×	c	METECROLOGICAL TABLES".
00101	6∻	¢	
DØ193	7 \$		TRAT 10=373.16/T
00104	Ø#		PARTIE 7.9029844TRATIO-1.))
06195	9*		PART2=5.028(38:AALCG1(34TRATIO)
00156	15⇔		PART6=d 3.49149#LTRATIO-1.))
00107	11#		PART4=add1./d10.44FART6))-1.)48.1320E-03)+3.005714
00110	12+		PART7=11.344#x1d1./TRATIO))
DO111	13+		PART3=4 4410, ##PART7) -1.) \$1.3816E-57)
00112	144		PARTS:PART2-PART3+PART4-PART1
00113	15#		VAFRES::10.+::FART5
DO114	160		RETURN
00115	17#		ec ·

END OF COMPILATION' NO DIAGNOSTICS.

MAP, \$ RADMAR/SLANT, TEGGG7/SEANT MAP 0023-08/20-18/50 -40,}

1.	LIB	LTV#4RL16.
2,	1N	HAIN '
3.	IN	RADM:O
4,	IN	COEF.
5.	lN	VAFRES
6.	IN	TRANS
7.	IN	TEMTAB

ADDRESS LIMITS 001000 025412 040000 073377 STARTING ADDRESS 021320

WORDS DECIMAL 10507 IDANK 14080 DBANK

SEGMENT MAIN		001000 025412		040000 573377
NSWTC\$/FOR	1	001000 001021		
NRBLK\$/FCR	1	001022 551547		
NR-ND\$/FOR	1	901059 591127	2	D49000 049011
N-EF\$/FCR	1	001130 501333	2	040012 040031
NFTCH1/FQR	1	001334 001634	2	040032 549067
NEDCV\$/FOR	1	001635 001779	2	040070 045127
NFTV\$/FOR	1	001771 002913		
NCNVT\$/FCR	1	002014 002246	2	040130 040217
NCLOS\$/FOR	1	002247 502407	5	045220 046244
N-DLK\$/FOR	1	002410 002532		
NBSCL\$/FCR	1	DD2533 002694		
NUFCA\$/FOR	1	002605 002649		
NBFUG\$/FCR			2	045245 042446
BBCLOR/UTL	1	002641 002703		
BBIN/VIL			9	040447 043931
BBINOT/UIL			ō	043032 043395
BBCCM/UTL			0	0433 96 043657
NININE/FOR	1	002704 993132	2	043660 043792
NINPT\$/FOR	1	003133 004012	2	043793 943725
NOTINS/FOR	1	004013 004349	2	043726 543736
NOUT\$/FOR	1	004341 005315	2	643737 643779
NFHT\$/FOR	1	005316 PG6223	5	043771 044907

	1	D06224 006356	2	G44919 G44112
NIGER\$/FCR NFCHK\$/FCR	•	006357 007160	2	U44113 U44254
M-CHR277 CR	•		4	044255 044326
NTAB1/FOR			2	044327 044379
NEXP51/FCR	1	007161 007244	2	044371 044400
BOCK OF YUTL	3	007245 567314		
BECFENZUIL	1	007315 007516	0	044401 044440
ERU\$/UTL				
BECOUT/UTL			O	044441 044794
SQRT\$/FOR	1	007517 007556	2	944705 944716
ASTNCOSE/FOR	1	007557 007772	0	944717 944744
NIEUF#/FOR	1	007773 019034		
UCHSYS ACCIMIN BLOCK)				044745 045006
HUMONITOR/FOR	1	010035 011216	2	G45007 G45533
			4	UCHSYS
NOSYH\$/FOR	1	G11217 G11446	2	045534 545545
NIERI/FOR	1	G11447 D11531	2	045541 045670
NCBUF \$ /FOR	1	011532 011571		
SINCOSE/FOR	1	011572 011723	2	D45671 D45712
ALOG\$/FOR	1	611724 512541	2	(45713 (45753
NEXP61/FOR	1	012042 012234	2	045754 046025
NERR\$/FCR	1	012235 012571	2	046026 046202
EXF\$/FOR	1	G12572 G12660	2	046203 046223
BNDCO	1	012661 012753	0	046224 046262
			30	D46263 T463(X)
VLAGH	1	012754 G13D23	30	046301 546316
LASLY	1	013024 013367	0	046317 546376
			30	046377 046414
ERMUKV/MSFC	1	013370 G13417	0	046415 046430
			2	BLANK\$COMMON
CCMPAT/HSFC	1	013420 913422	9	046431 046432
XHCEV/MSF C	1	D13423 D13450	ū	046433 046441
			2	BLANK\$COMMON
PLOTY	1	013451 013472	3 0	046442 046457
HOLLY	1	013473 01353 0	9	046460 G4646U
			30	046461 046476
SCCTAB			0	046477 546576
XAXISV	1	O13531 G13617	30	946577 946G14
LINRY	1	013620 014255	0	046615 946677
			2	BLANK SCOMMON
NONLINY	1	014256 014573	O	
			2	BLANK\$CCHP/ON
ERRLINY	1	D14574 D14675	0	
			2	BLANK\$COM/ON
ERRNLY	1	D14676 D15011	o	
			2	
HOLDV/MSFC	1	015012 015046	9	
			2	
SFTCTV/HSFC	1	015047 015107	a	
			2	
GRAC\$	1	015119 015142	U	
			30	
GGG «COMMON BLOCK)				047934 547936
\$1ZEV/MSFC	1	015143 015224	0	
	3	GGG	2	
MEIGENR	1	015225 015372	O	
			Z	BLANK\$COMMON

- - - - **- - -**

TABL I V			0	D47141 D47461
EDIT			0	D47462 G47576
CAHRAY	1	015373 015605	0	G47577 G47642
			30	047643 047666
SMXYV .	1	015606 015646	0	047667 547667
			39	G47679 G47795
RI1E2V	1	015647 016114	O	047706 047734
			30	047735 047769
VCHARY	1	016115 016357	G	(147761 050001
			30	050002 050033
AFRNTV	1	016360 016436	O	050034 050052
			2	BLANKICCHTICN
PRINTY	1	016437 516556	ø	D50053 D50061
*******			39	059962 959195
GRIDIY	1	D16557 G17353	0	050106 050222
			2	Blankscomm
SETMIV/MSFC .	1	017354 017432	G	050223 050237
SE INITIAL C	-		2	BLANKSCOMMON
10FRM\$	1	D17433 G17755	O	050240 050277
IUPRAG	_		4	SCOPMS
•			6	050300 050413
			30	050414 050431
SCOMUS ACCUMUN BLOCK)				050432 050561
=	1	017756 929639	D	09/1562 052237
PLOTS	•		4	SCCM4\$
			30	052240 052345
	1	020631 021171	O	052346 052375
XSCALV	•		30	D52376 D5241€
	1	021172 021317	0	G52417 U5242U
LINEY	_			052421 952425
Z3 «COMMON ELOCK) Z2 «COMMON ELOCK)				Ú52426 GYÚLOO
ZI ACOMAIN BLOCK)				070156 971C41
BLANKSCOPPIN ACCIPTION	er cont.)			
	1	021320 024074	D	D71642 G72611
MAIN	3	Zi	2	BLANKECOHMON
	5		4	72
	1		Đ	072612 072676
RADMOD	3	_	2	BLANK\$CCHMON
	5	_	4	72
	3		0	072677 072700
COEF	•		2	BLANK\$COMMEN
	1	024403 024472	0	072701 072731
VAFRES	•	DEMAND DETTIL	2	BLANK\$COHMON
	1	024473 025202	C	
TRANS	3	· •	2	
	3	4.	4	
	1	025203 025412		073035 973377
TENTAB	_	·		BLANK SCORMON
	3	, 41	•	- -

SYSSERI 188. LEVEL 57N END OF COLLECTION - TINC 3.293 SECONOS

MAP,S RADMAR/SLANT,TEU0007/SLANT1 MAP 0023-08/20-18:51 -40;1

1.	LIB	LTV\$+RLIB.
2.	IN	HAIN
3.	IN	RADHIC
4.	IN	CCEF
5.	IN	VAFRES
6.	IN	TRANS
7.	IN	TEMTAB

ADDRESS LIMITS 001900 024567 STARTING ADDRESS 020767

040000 060372

WORDS DECIMAL

10104 IBANK

8443 DEANK

	SECHENT HAIN	001000 02456	7	040000 060372
NSWTC\$/FCR	1	001000 001021		
NRELK\$/FOR	1	001022 001047		
NRMC\$/FOR	1	001959 001127	2	040000 040011
NAEF\$/FOR	1	DQ1139 001333	2	040012 040031
NBDCV1/FOR	2	001334 001467	2	040032 040071
NFTCH\$/FOR	1	001479 001779	2	040072 949127
NFTV\$/FOR	1	001771 002013		
NCNVT\$/FOR	1	002014 002246	2	049130 040217
NCLOS\$/FOR	1	002247 002497	2	049229 049244
NABLK\$/FOR	1	002410 002532		
NESEL\$/FOR	1	002533 002694		
NUPDAS/FOR	1	002605 992649		
NBF00\$/FOR			2	045245 (142446
PDCLCR/LITE	1	002641 002703		
BOIN/UTL			O	042447 043031
BO INSTITUTE			0	043032 043305
BBCOM/UTL			O	D43306 043G57
NOTINS/FOR	1	002794 003231	2	043669 043670
NOUTS/FOR	1	003232 004206	2	043671 043722
NIOFR\$/FOR	1	004207 004341	2	043723 044025
NIOERS/FOR	1	004342 004570	2	044026 044050
NININS/FOR	1	004571 005459	2	D44951 644973

NFH1\$/FCR	1	D05451 T0G356	5	044074 044112
NFCHK\$/FOR	1	006357 007160	2	044113 G44254
			4	044255 044326
NTAB\$/FCR			2	044327 044370
NEXF5\$/FCR	1	007161 007244	2	D44371 D44490
C BCLCF/UTL	1	D07245 D07314		
EBOPENZUTL	1	CO7315 DO7516	O	G44491 G44449
ERU\$/UTL				
COTOT/UTL			D	044441 044704
SORT\$/FOR	1.	007517 007556	2	044705 044716
ASTINCOST/FOR	1	007557 007772	6	D44717 C44744
NCEUF\$/FCR	1	007773 S19032		
NIER\$/FOR	1	010033 010115	2	044745 045074
NIBUF\$/FCR	1	010116 010157		
WOMSYS ACCHMON BLOCK)				045975 045136
HEMONI TOR/FOR	1	010160 011341	2	045137 945663
			4	UCHSYS
sinces\$/FcR	1	G11342 G11473	2	045664 045705
ALCCS/FCR	1	011474 011611	2	645706 545746
NEXP61/FOR	1	011612 012004	2	945747 946929
NERR\$/FOR	1	012005 012341	2	046021 046175
EXF1/FOR	1	012342 012430	2	046176 046216
PRINTY	1	012431 912559	O	046217 046225
		,	30	D46226 G46251
SCCTAB			D	D46252 D46351
ENECD	1	012551 012643	o	046352 046410
2-042			30	046411 046426
VLAGM	1	012644 012713	30	046427 046444
LABLY	1	D12714 013257	Ö	546445 C46524
Dag.	-		30	046525 E46542
ERMRKV/MSFC	1	013260 013307	ם	D46543 D46556
Extractor L	-		2	BLANKECOMMON
COMPAT/NSFC	1	013310 013312	Ð	046557 946560
XMODV/MSFC	1	G13313 G13349	9	046561 046567
A CONTRACT	_		2	BLANK\$COMMON
HOLLY	1	013341 013376	9	946579 546579
rocev	-		30	046571 046696
XAXISV	1	013377 G13465	30	046607 046624
LINRY	1	D13466 D14123	a	046625 046707
Cinci	-		2	BLANK\$COMMON
NONLINV .	1	O14124 G14441	0	D46710 546754
HOICHV :	•		2	BLANK SCOMICN
ERRLINV	1	014442 014543	0	046755 546771
EKKENY	-		2	BLANK & COMMON
ERRNLY	1	014544 014657	0	D46772 D47094
ENCINE. V	-	******	2	BLANKSCORMON
HOLDY/HSFC	1	014660 014714	0	047005 047012
HULLI YV HSP C	•	014000 014114	2	BLANK\$COMMON
SHATT	1	014715 014755	- 0	047013 047013
DMX11	•	02/1/20 -17/30	30	047014 047031
ectely meec	1	014756 015016	0	047032 047042
SETCTV/MSFC	٠	314.30 013010	2	BLANK & COMMON
ACTUIL (MESS	1	015017 015075	ō	047943 547957
SETMI V/MSFC	•	Jay-1. 0140.1J	2	BLANK\$COMMON
4D464	1	015076 015130	ō	D47060 047061
GRAC\$	•	013010 013130	30	047962 947977
and constitute the source				047100 047102
GGG «COMMON BLOCK)				

h I Sty duct d		D18134 C16343	٥	CARLOR CARLO
81ZEV/MSFC	1 3	015131 015212 666	2	047103 047116
	1	015213 G15369	0	BLANK\$COMMON
MOGENR	•	013513 013300	2	BLANKSCOMMON
TABLIV			ō	D47205 047525
RITEZY	1	015361 015626	0	047526 047554
KIIEZY	•	013301 013050	30	047555 047600
VCHARV	1	015627 016071	0	D47601 U47621
TCFBRY	•	0130E1 010://1	30	047622 047653
EDIT			D	D47654 G47770
CAMRAV	1	016072 016304	ō	047771 050034
CAMINA	•	DIGHT WOULD	3/3	050035 050000
XSCALV	1	D16305 D16645	0	050061 050110
	٠	1/100//3 1/100//3	36	050111 050131
LINCV	1	016646 016773	0	050132 050133
GRIDIV	1	G16774 G17579	ō	050134 050250
	_		2	BLANK ECCHTICN
TOFRING	1	017571 020113	-	G50251 G50310
	•		4	SCCMIS
			8	090311 050424
			30	G511425 G511442
SCOMME «COMMON BLOCK)				050443 050572
PLOTS	1	020114 020766	6	050573 052250
	_		4	SCOPERS
			30	Q52251 G5235G
23 «COMMON BLOCK)				O52357 G52363
ZZ WCCHRACH DLCCK)				D52364 U55153
Z1 «COMMON BLOCK)				055154 G56G37
BLANKSCOMMON ACCOMION BLO	CK)			
MAIN	1	020767 123335	G	056649 057623
	3	21	2	BLANKECCHELN
	5	23	4	2 22
RADHOD	1	023336 523557	O	957624 957671
	3	Zi	2	BLANK\$CCHMUN
	5	Z 3	4	Z 2
COEF	3	Z1	Ð	057672 05767 3
			2	BLANKSCOMMON
VAPRES	1	023560 023647	Ð	057674 057724
			2	BLANK \$CCHINCN
TRANS	1	023650 024357	0	057725 060027
	3	Z1	2	BLANK\$COM40N
			4	22
TEHTAB	1	024360 024567	9	060030 060372
	3	Z1	2	BLANK\$COMMON

SYSSWILIBS. LEVEL 57N
END OF COLLECTION - TIME 3.123 SECONDS

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